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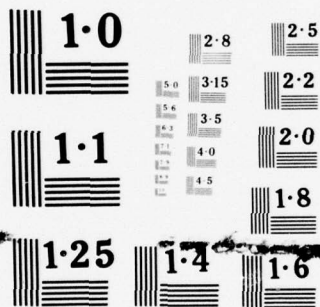
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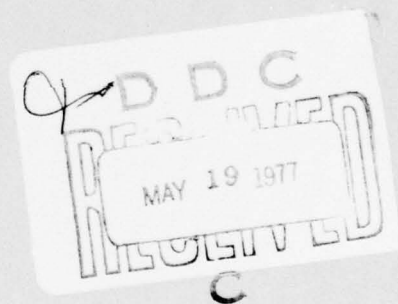


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SOFTWARE DESIGN FOR AN INTERACTIVE CRISIS EARLY WARNING PROTOTYPE SYSTEM

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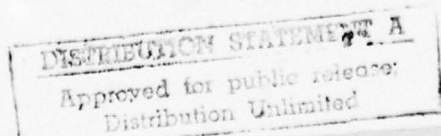
James F. Wittmeyer



CRISIS MANAGEMENT PROGRAM

CYBERNETICS TECHNOLOGY OFFICE
DEFENSE ADVANCED RESEARCH PROJECTS AGENCY
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The objective of the Crisis Management Program is to develop and transfer to users in the Department of Defense advanced technologies and methodologies for crisis warning and decision-making. The technologies and methodologies draw upon research in the social, behavioral, and computer sciences, including quantitative forecasting, decision analysis, and cybernetics. The program is sponsored by the Cybernetics Technology Office of the Defense Advanced Research Projects Agency (ARPA). Technical progress is monitored by the Office of Naval Research — Organizational Effectiveness Research Programs. Current and past participants in the program include:

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TECHNICAL REPORT 76-20

SOFTWARE DESIGN FOR AN INTERACTIVE CRISIS EARLY WARNING PROTOTYPE SYSTEM

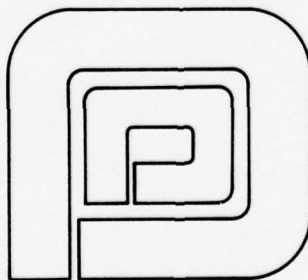
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James F. Wittmeyer

December 1976

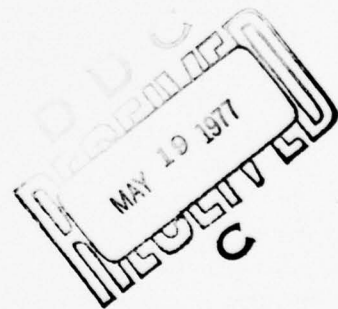
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SUMMARY

Introduction

Statement of problem and proposed solution. This report describes in detail one component of the development of an integrated crisis warning system, the design and use of interactive computer software necessary for the development of such a system.¹ The component was developed for the Defense Advanced Research Projects Agency's Cybernetics Technology Office during the period from January 1 to September 30, 1976. Interactive software is an essential component of the development, testing, and evaluation of a user-oriented integrated system and of prototype crisis warning systems.

Design, Test, and Demonstration of the First-Stage Crisis Early Warning Prototype System

The prototype system, as designed, tested, and developed, was comprised of:

- (1) five quantitative international political indicators;
- (2) a forecasting capability which includes an international crisis object, a short-range retrospective goal, and an associative method; and
- (3) a sophisticated computer base endowed with efficient information storage, retrieval, processing, and display capabilities.

The system has been tested for its ability or inability to forecast crises retrospectively. The demonstration system for the prototype is comprised of computer hardware and software necessary for the design, installation, and operation of interactive user-oriented systems.

System Description

The prototype system described in this report is the foundation upon which future systems will be built in

¹For an overview of progress on the entire project, see S. J. Andriole, Progress Report on the Development of a Crisis Early Warning Prototype System, Technical Report 76-19 (McLean, VA: Decisions and Designs, Incorporated, December, 1976).

parallel with the on-going development and application of quantitative indicators for early warning. The system is an overlayed FORTRAN program consisting of 1 main overlay, PROGRAM ANALYZ; 4 primary overlays; PROGRAMS DIALOG, SEARCH, PLOT, AND TABULAR; 29 subroutines; and 2 functions. The system is written in Super FORTRAN (a United Computing Systems, Incorporated compiler), and requires a time-sharing driver resident on a host mainframe. The program is relatively inefficient without the use of a Tektronix graphics terminal.

Sample Program Output

A sample of the output from the crisis early warning prototype system is notated to describe the area in the program from which the output is generated.

System Design

A graph of the crisis early warning prototype shows the relationship each overlay and its associated subroutines has to the main overlay as well as to each other.

System Flow Charts

The main overlay and each of the primaries are flow-charted. Calls to the subroutines are shown as predefined processes and are not charted individually.

Documented FORTRAN Source Code

To allow access and ease of modification to any FORTRAN programmer, each routine is internally documented. Appendixes A and B contain, respectively, the NATION file and the RWINDX file, the index for the events file by month.

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This report describes the product of a dedicated and combined effort of many individuals without whose ideas and participation nothing would have been accomplished. Acknowledgments to those whose work is presented here include thanks to Richard W. Parker and Judith Ayres Daly who contributed to the substantive component of the project. Special thanks to L. Scott Randall and James J. Allen, Jr. whose contributions were the foundations upon which the software was built. Thanks is also due to Michael L. Hays and Theresa A. Buxton for their helpful editorial assistance as well as to John F. Correnti, John E. Billheimer, Judith Mial, and Phyllis Hutchison for their design and advice in the artwork and production of the document. Acknowledgment also to Lee Decker who took on the responsibility of the preparation and coordination of all the efforts. Finally, acknowledgment to Stephen J. Andriole and Robert A. Young for their leadership in this project.

SOFTWARE DESIGN FOR AN INTERACTIVE CRISIS EARLY WARNING PROTOTYPE SYSTEM

1.0 INTRODUCTION

This report describes the design and use of interactive computer software necessary for the development of an integrated crisis warning system. Interactive software is an essential part of the development of a user-oriented integrated system, as well as the development and test of prototype crisis warning systems. Accordingly, this report summarizes the development and test of the first-stage crisis early warning prototype system during the period January 1 to June 30 and, to a much greater extent, during the period July 1 to September 30, 1976.

1.1 Overview of the Problem

Recent history has acquainted us with a variety of unique problems, including resource and energy scarcity, population expansion and maldistribution, nuclear proliferation, and international terrorism. As a dominant global actor, the U.S. must deal with such problems, especially when they evolve into threatening international crises. Procedures designed to anticipate, avert, and manage problems and crises of all sorts should thus continue to be developed, evaluated, and improved.

In an effort to respond to the defense imperatives connected with intra- and international problems and crises, the defense community has devoted attention to the development of approaches and methods designed to enhance its overall warning and management capabilities. While much of this work has been productive, much remains to be done. Specific problems include the systematic identification, use, and combination of quantitative military, political, and economic indicators; the integration of quantitative estimates of U.S. military, political and economic interests abroad; and, perhaps most importantly, the development and integration of techniques for the rapid and efficient retrieval, manipulation, and display of important information.

1.2 Overview of a Proposed Solution

In an effort to contribute to the defense community's ability to forecast intra- and international crises, DDI

has developed and tested a first-stage crisis early warning prototype system.¹ The testing addressed two considerations. First, it involved the ability of the prototype to forecast retrospectively a number of international crises; and, second, it involved demonstrating precisely how crisis warning systems such as the prototype might be used. The interactive software discussed in this report is relevant to both aspects of the test. Section 2.0 briefly introduces the crisis early warning prototype system, while sections 3.0 through 7.0 of this report describe and display these software capabilities.

¹For more detail on the first-stage prototype, see S. J. Andriole, Progress Report on the Development of a Crisis Early Warning Prototype System, Technical Report 76-19 (McLean, VA: Decisions and Designs, Incorporated, December, 1976).

2.0 DESIGN, TEST, AND DEMONSTRATION OF THE FIRST-STAGE CRISIS EARLY WARNING PROTOTYPE SYSTEM

2.1 Range of Crisis Indicators

The prototype is comprised of quantitative political indicators developed with reference to the concept of "event interaction." Future prototypes will be comprised of additional indicators, as Figure 2-1 suggests with reference to the range of potential indicators.

MILITARY				POLITICAL				ECONOMIC			
Static		Dynamic		Static		Dynamic		Static		Dynamic	
I	E	I	E	I	E	I	E	I	E	I	E

I - INTERNAL
E - EXTERNAL

Figure 2-1
RANGE OF CRISIS INDICATORS

Event-interactions may be defined as official statements or actions which cross national boundaries.¹ They are particularly suited to the task of short-range crisis forecasting because they are dynamic and readily receptive to measurement.

¹The concept of an event-interaction was developed with reference to the study of international relations by Charles A. McClelland. See C. A. McClelland, Theory and the International System (New York: Macmillan, 1966), and C. A. McClelland et al., World Event/Interaction Survey (WEIS) Handbook and Codebook, WEIS Technical Report (Los Angeles: University of Southern California, January, 1969). Also see P. M. Burgess and R. W. Lawton, Indicators of International Behavior: An Assessment of Events Data Research, Sage International Studies Series, Vol. 1 (Beverly Hills, CA, 1972); C. W. Kegley et al., eds., International Events and the Comparative Analysis of Foreign Policy (Columbia, SC: University of South Carolina Press, 1975); and E. E. Azar and J. D. Ben-Dak, eds., Theory and Practice of Events Research (New York: Gordon and Breach, 1975); among many others.

Event-interactions are generated via public or private (classified) sources and an "event coding scheme." For example, if the New York Times reported that the Soviet Union warned the Chinese to withdraw from a particular border, the event would be coded as a "warning" and assigned a numeric code. Similarly, requests, proposals, accusations, and the like are coded numerically and stored for future retrieval and processing. The event coding scheme employed for prototypical purposes is the product of the World Event Interaction Survey (WEIS), an event data project which, with ARPA support, refined the methodology associated with the collection and treatment of event data. Currently, the WEIS data file consists of over 78,000 events coded from the New York Times for the period 1966 to the present.²

Events may thus be classified according to a predetermined coding scheme. The WEIS scheme recognizes 63 kinds of events in 22 broad categories. There are 10 cooperative categories and 12 conflictual ones. All 22 appear in Figure 2-2.

The basic coding elements include the type of event observed as well as the time of its observation. Actors and targets constitute the remaining two elements. In a very real sense, then, the coding elements provide information regarding who (actor) does what (event) to whom (target) and when (time).

A number of crisis indicators have been developed from event data. Ours have been organized with reference to the concepts of volume and variety and the realities of one- and two-way flows.³ As Figure 2-3 illustrates, we have entered activity, tension, and uncertainty indicators into the volume and variety cells.

²The WEIS data set continues to be updated and used by scholars, R&D analysts, and policy-makers, and constitutes one of the very few--if only--consistently coded ten-year-plus data set.

³The concepts of volume and variety were outlined by McClelland. See C. A. McClelland et al., The Management and Analysis of International Event Data: A Computerized System for Monitoring and Projecting Event Flows, WEIS Technical Report (Los Angeles: University of Southern California, September, 1971). Also see R. A. Young et al., The Utilization of ARPA-Supported Research for National Security Planning, Technical Report (Arlington, VA: CACI, Incorporated, October, 1972) and B. I. Spector et al., Quantitative Indicators for Defense Analysis, Final Technical Report (Arlington, VA: CACI, Incorporated, June, 1975). We have, however, made a number of adjustments to the political indicators developed in the above reports.

1. YIELD
 - 011 Surrender, yield to order, submit to arrest, etc.
 - 012 Yield position; retreat; evacuate
 - 013 Admit wrongdoing; retract statement
2. COMMENT
 - 021 Explicit decline to comment
 - 022 Comment on situation-pessimistic
 - 023 Comment on situation-neutral
 - 024 Comment on situation-optimistic
 - 025 Explain policy or future position
3. CONSULT
 - 031 Meet with; at a neutral site; or send note
 - 032 Visit; go to
 - 033 Receive visit; host
4. APPROVE
 - 041 Praise, hail, applaud, condolences
 - 042 Endorse other policy or position; give verbal support
5. PROMISE
 - 051 Promise own policy support
 - 052 Promise material support
 - 053 Promise other future support
 - 054 Assure; reassure
6. GRANT
 - 061 Express regret; apologize
 - 062 Give state invitation
 - 063 Grant asylum
 - 064 Grant privilege, diplomatic recognition de facto relations, etc.
 - 065 Suspend negative sanctions; truce
 - 066 Release and/or return persons or property
7. REWARD
 - 071 Extend economic aid
 - 072 Extend military assistance
 - 073 Give other assistance
8. AGREE
 - 081 Make substantive agreement
 - 082 Agree to future action or procedure; agree to meet, to negotiate
9. REQUEST
 - 091 Ask for information
 - 092 Ask for policy assistance
 - 093 Ask for material assistance
 - 094 Request action; call for
 - 095 Entreat; plead; appeal to
10. PROPOSE
 - 101 Offer proposal
 - 102 Urge or suggest action or policy
11. REJECT
 - 111 Turn down proposal; reject protest demand, threat, etc.
 - 112 Refuse; oppose, refuse to allow
12. ACCUSE
 - 121 Charge; criticize; blame; disapprove
 - 122 Denounce; denigrate; abuse
13. PROTEST
 - 131 Make complaint (not formal)
 - 132 Formal complaint or protest
14. DENY
 - 141 Deny an accusation
 - 142 Deny an attributed policy, action, role or position
15. DEMAND
 - 150 Issue order or command, insist; demand compliance, etc.
16. WARN
 - 160 Give warning
17. THREATEN
 - 171 Threat without specific negative sanctions
 - 172 Threat with specific negative sanctions
 - 173 Threat with force specified
 - 174 Ultimatum; threat with time limit and negative sanctions specified
18. DEMONSTRATE
 - 181 Nonmilitary demonstration; walk-out on
 - 182 Armed force mobilization, exercise and/or display
19. REDUCE RELATIONSHIP
 - 191 Cancel or postpone event
 - 192 Reduce routine international activity; recall officials, etc.
 - 194 Halt negotiations
 - 195 Break diplomatic relations
20. EXPEL
 - 201 Order personnel out of country
 - 202 Expel organization or group
21. SEIZE
 - 211 Seize position or possessions
 - 212 Detain or arrest person(s)
22. FORCE
 - 221 Non-injury destructive act
 - 222 Nonmilitary injury/destruction
 - 223 Military engagement

Figure 2-2
THE WEIS EVENTS CODING SCHEME

	Volume	Variety
One Way Flow (A → B) (B → A)	Total Activity Level Cooperative Activity Level Conflictual Activity Level	Tension Level Uncertainty Level
Two Way Flow (A ↔ B)	Total Activity Level Cooperative Activity Level Conflictual Activity Level	Tension Level Uncertainty Level

Figure 2-3
POLITICAL EVENT INDICATORS

One- and two-way (volume) flows yield activity levels of three distinct types. First, it is possible to monitor the volume of total activity (the total number of cooperative and conflictual events) sent or exchanged. Second, it is possible to monitor the level of cooperative activity sent or exchanged. And third, it is possible to monitor the conflictual activity level.

The total, cooperative and conflictual, one- and two-way activity levels suggest the need for indicators which will calculate the mix of cooperative and conflictual events. This derivative indicator may be regarded as a tension level. Tension ranges from 0 to 100 and reflects the percentage of the total number of events sent or exchanged that are cooperative and conflictual, and may be calculated as follows:⁴

COOPERATIVE BEHAVIOR (CO)

PROPOSE
AGREE
PRAISE...

CONFLICTUAL BEHAVIOR (CON)

DENOUNCE
ACCUSE
THREATEN...

$$\text{TENSION} = \left\{ \frac{\text{CO} - \text{CON}}{\text{CO} + \text{CON}} + 1 \right\} \times 50$$

⁴This algorithm is derived from those, including policy style and relations, developed at CACI. See, for example, T. Rubin, D. Peasley, and L. Hopkins, Dissemination and Evaluation of Quantitative International Affairs

The third indicator measures the range of actions occurring in each of the event categories. Actors which initiate numerous events across the 22 event categories may be said to behave "inconsistently," while those who initiate only a small number of event types are more consistent. The measure of this consistency or inconsistency is, in information theory, regarded as Hrel (relative uncertainty),⁵ which may range from 0 to +1.

These political activity, tension, and uncertainty indicators are tracked according to how they deviate from normal ranges of behavior. In order to measure the precise degree of abnormality exhibited by individual nations, or pairs or groups of nations, standard deviations from the normal (mean) political activity, tension, and uncertainty levels are calculated and standardized into Z-scores. Z-scores indicate the number of standard deviations from the mean and are calculated as follows:

$$Z\text{-SCORE} = \frac{(\text{SCORE AT TIME } n) - (\text{MEAN OF SCORES UP TO TIME } n-1)}{\text{STANDARD DEVIATION FOR ALL SCORES UP TO TIME } n-1}$$

2.2 Forecasting Capability

The prototype is endowed with a number of specific forecasting options which constitute its overall forecasting capability. The options include an international crisis

Indicators, Technical Report (Santa Barbara, CA: CACI, Incorporated, July, 1972) and Spector, Quantitative Indicators. Previous indicators ranged in value from -1 to +1. They also acknowledged the impact of neutral events. Our 0 to 100 one- and two-way tension levels have been modified with special reference to crisis forecasting. We are currently examining a number of aggregations and weighting techniques for specific application to crisis forecasting.

⁵Research regarding Hrel was pioneered in international crisis research by McClelland. See C. A. McClelland et al., Management and Analysis of International Event Data; C. A. McClelland, "The Beginning, Duration, and Abatement of International Crises: Comparisons in Two Conflict Arenas," in C. F. Hermann, ed., International Crises: Insights from Behavioral Research (New York: Free Press, 1972, pp. 18-108); and D. A. Zinnes, Contemporary Research in International Politics (New York: Free Press, 1976).

object, a short-range retrospective goal, and an associative method.

The prototype is thus designed to generate short-range forecasts of international political, military, and economic crises.

Insofar as the monitoring of events does not in itself shed much light upon the explanation of event flows, the methodology used is not objective in a causal sense. Instead, the method is an associative one which is less objective than those based, for example, upon causal modeling. Accordingly, the method involves monitoring Z-scores (for all of the indicators, all of the flows, and for specific time increments) and linking the scores with previous pre-crisis, crisis, and non-crisis behavior (again for all the indicators, all the flows, and for specific time increments). The method thus requires that pre-crisis, crisis, and non-crisis periods be identified, separated, and then associated with the Z-scores observed during past periods. This procedure enables us to assign probabilistic meanings to Z-scores when they are observed at certain levels in the future.

2.3 Computer Base

The prototype is currently endowed with efficient information storage, retrieval, processing, and display capabilities. With the aid of a Tektronix 4051 graphics terminal and the software described at length below, the user is able to command the rapid calculation and display of one- and two-way activity, tension, and uncertainty levels on a monthly, quarterly, or yearly basis. In addition, the system has the capability to present the indicators in different forms, including numerical tables comprised of frequencies, Z-scores, tension levels, and the like, with graphs or bar-charts of the same plotted over extended or relatively short periods of time, or both.

2.4 Testing the Crisis Early Warning Prototype System

The system has been tested for its ability or inability to forecast crises retrospectively. The specific crises forecasted include the 1967 Sino-Soviet border clash, the 1968 Soviet invasion of Czechoslovakia, and the 1971 Indo-Pakistani War. Detailed results of these tests may be found elsewhere.⁶ We need to note here only that the analysis of the three crises revealed that the use of quantitative political indicators of activity, tension, and uncertainty

⁶See Andriole, Progress Report.

would have improved the ability of the defense community to forecast the crises.

2.5 Demonstrating the Prototype System

Another operational dimension of the prototype system is comprised of the computer hardware and software necessary for the design and installation of interactive user-oriented systems. Accordingly, the major components of the demonstration system now include an event-interaction data base, interactive software, and graphic and tabular display capabilities. As described below, the interactive software enables one to issue commands and receive prompt responses. While the first cut of the demonstration system requires the user to respond to a good deal of prompting, later versions will require minimal prompting and permit quick access to all aspects of the system.

3.0 SYSTEM DESCRIPTION

"-CRISIS" is the name of the command file that causes execution of the crisis early warning prototype system. The system itself, although called a system, is actually an overlaid FORTRAN program. The program currently resides on disk in two forms: FORTRAN source code and relocatable binary. There are also several archived copies maintained on 800 BPI, odd parity, magnetic tape. The portability of the program itself depends upon several factors: the similarity of ANSI FORTRAN IV to United Computing Systems, Incorporated (UCS) Super FORTRAN, the availability of Tektronix Plot-10 Software, and the access to certain library and intrinsic functions. The fulfillment of these requirements makes the crisis early warning prototype system a highly efficient, convertible, stand-alone program that provides all functions pertaining to the selection and display of quantitative political indicators for early warning. Consequently, the program is, in fact, a system.

3.1 Objective of the Program

Our goal has been very specific from the outset. It is to parallel the research connected with the development and application of quantitative (military, political, and economic) indicators for early warning.¹ As new indicators are developed and integrated into the research design, the program will be modified to accommodate their display. Accordingly, the prototype system described in this report may be viewed as the foundation upon which future systems will be built. The system may or may not remain intact as it currently exists; at the same time, it will remain either as the primary vehicle through which the computer sciences department will perform the required tasks, or as a smaller part of a more sophisticated whole.

The first-stage prototype system was configured by using the modular programming technique to yield one main overlay and four primary overlays. Each overlay contains

¹For a detailed look at the scope, method, and purpose of the crisis forecasting research program see Decisions and Designs, Incorporated, The Development of a Crisis Early Warning Prototype System (Technical Proposal, McLean, VA, December, 1975); Decisions and Designs, Incorporated, The Development of a Crisis Early Warning Prototype System (Technical Proposal, McLean, VA, July, 1976); and S. J. Andriole, Progress Report.

all the subroutines required to ensure the autonomy of the overlay resident at any given moment. It is also important to note that the main overlay always remains in core; that all overlays are called from the main overlay and not from each other; that overlays may be called in any order regardless of their number; that once an overlay has been called, it resides in core below main; that variables are passed between overlays via labeled COMMON; that subroutines may be called only by the overlay program in which they reside; and that the primary purpose of an overlaid program is to conserve core space.

The CEWPS was written in Super FORTRAN (SFO), a FORTRAN VI extension language offered by United Computing Systems, Incorporated. The CEWPS can be executed by using the SFO compiler on any Control Data 6000 series computer system running the KRONOS operating system. KRONOS itself, however, is not a requirement. Any timesharing driver should suffice since the system utilizes the primitive FORTRAN I/O READ and WRITE functions. It must be emphasized, however, that the availability of TEKTRONIX Plot-10 (or similar graphics software) and compatibility of FORTRAN Library and intrinsic functions are requisite to the operation of the program.

Since the prototype system generates sophisticated graphical output, it would be inefficient to execute without a TEKTRONIX 4010, 4012, 4014, or 4051 terminal. It is also important to provide a user with 1200 baud communications, although a degraded version can be made to plot at 300. The primary overlay which produces the graphics is hard-coded to execute at 1200 baud.

The program consists of 1 main overlay, 4 primary overlays, 26 subroutines, and 2 functions (see Section 4.0 diagrams). Section 3.2 briefly describes each overlay and subroutine. These comments are further supplemented by Sections 4.0, 5.0, and 6.0. Section 6.0 is incomplete in that it only charts the flow of main and primary overlays (not the subroutines). Section 7.0 includes all source code. Each routine is internally documented, a step deliberately undertaken to allow any FORTRAN programmer access and ease of modification.

3.2 Overlay Descriptions

3.2.1 Main overlay (0,0) PROGRAM ANALYZ. This routine is the main driver. It consists of the program ANALYZ and three subroutines, BLANC, CREDITS, and INSTRNS. (See Section 4.0, System Diagram.) Program ANALYZ prints the system title and calls CREDITS. It then calls overlay 1 and 2 to initiate the selection of crisis cases. Once this is complete, overlay 2 returns to main and displays the user commands. Through a series of "if tests" on the user response,

the proper overlay and/or subroutine is called. The possible responses to user commands and the related calls are as follows:

```
'I' -- calls subroutine INSTRNS
'G' -- calls Overlay 4,0 (graphics)
'T' -- calls Overlay 5,0 (tabular O/P)
'F' -- calls Overlays 1,0 & 2,0 (a variation of
      initial case selection)
'A' -- calls overlays 1,0 & 2,0 (a variation of
      initial case selection)
'C' -- calls overlays 1,0 & 2,0 (initial case
      selection)
'E' -- Go to Print Statement & END program
```

Subroutine Credits--This subroutine contains no logic. It simply writes formatted output to the CRT. The routine immediately returns to Main.

Subroutine Blanc--This subroutine consists primarily of two calls to Plot-10 (AG II) (i.e., INITT and FINITT). By utilizing these calls, the subroutine can accomplish two tasks. First, it blanks the CRT. Second, it moves the cursor to the home position. In the near future, we plan to replace these calls with the simple output of a control character to blank and home the screen; however, at 1200 baud, it becomes difficult to accomplish this task without running into a timing problem (note the existing print statement).

Subroutine INSTRNS--Like CREDITS, this subroutine contains no logic. It simply writes to output a formatted description of the operation of Overlay 4,0 (graphics). This routine is called when the user responds with the character 'I' to the USER COMMAND request.

3.2.2 Primary overlay (1,0) PROGRAM DIALOG. This routine is simply a primary overlay. It consists of the program DIALOG and ten subroutines: NCODE, CASE, SETUP, TSETUP, SSBC, CZEINV, INDWAR, USSOV, USPEO, and SOVPEO (see Section 5.0, System Diagram). Program DIALOG does none of the actual user interaction. However, it does contain almost all the logic to call the proper subroutine under the current parameters, and it initiates the reading of both the NATION file and the RWINDEX file.

DIALOG will call Subroutine CASE and return the selected case number. It will then call any one of the subroutines associated with that case number to provide a heading to further parameter selection. The subroutines are associated with the menu provided in subroutine CASE in the following manner:

- 1 = SSBC (Sino-Soviet Border Clashes)
- 2 = CZEINV (Czechoslovakian Invasion)
- 3 = INDWAR (India-Pakistani War)
- 4 = USSOV (U.S.-Soviet Union)
- 5 = USPEO (U.S.-Peoples Republic of China)
- 6 = SOVPEO (Soviet Union-Peoples Republic of China)

Once the headers have been printed, the overlay calls subroutine SETUP.

Subroutine SETUP asks the user for the following information, which it passes back to the Overlay:

- Initiator - 3 characters
- Recipient - 3 characters
- Flow Direction - 1 integer
- Time Increment - 1 integer

When these parameters are converted to the proper values in common, DIALOG calls subroutine TSETUP. This subroutine asks the user for the start date (SDATE) and finish date (FDATE) of the time period for which the user desires to collect event data. The SDATE and FDATE parameters are asked for in the form MMM DD and returned to dialog in the form YYMMDD.

Having collected all necessary information to begin processing, the program then calls subroutines NCODE in order to validate the 3-character country code, look up the associated integer nation number, and store the 3-word (30 character) expanded country name, for example,

USA 002 UNITED STATES.

Finally, DIALOG will open and read file RWINDEX and find the address of the beginning date (SDATE) on the main data base.

3.2.3 Primary Overlay (2,0) PROGRAM SEARCH. This routine is another primary overlay. It consists of the program SEARCH, eight subroutines, and one function (see Section 5.0, System Diagram).

The SEARCH program collects the data from the main data base into arrays according to the parameters derived from Overlay 1,0. It also maintains the accumulation of several counters. The function NXTINC is a very integral part of the data collection. This routine signals the change of time increment from day to day, month to month, period to period, or year to year.

Once all calculations have been made, control is usually returned to MAIN.

Subroutine CONVRT--This subroutine is passed an integer array from SEARCH. It returns the same array in the real mode.

Subroutine ZSCORP--This subroutine calculates the progressive means and progressive Z-scores for a collection of items (array passed to it). The arrays passed should have data collected in increments starting at the beginning of the data base. It is also the function of this subroutine to use this data to calculate the Z-score and to delete all Z-scores except those that fall between SDATE and FDATE once the calculations are made.

Subroutine PTABLE--This subroutine assigns probabilities from Z-scores according to the type of event data passed to it. There are three types of event data Z-scores: TOTAL, CONFLICTUAL, and COOPERATIVE. A parameter passed from SEARCH tells the routine which type of data it has and thereby begins a table lookup by using the proper boundaries.

Subroutine HREL--This subroutine calculates the Hrel of total activity event data for each of a collection of time intervals.

Subroutine TENSION--This subroutine calculates the Tension Factor (ratio of cooperative to conflictual events) for each of a collection of time intervals.

Subroutine SMLTAB--This subroutine prints the 30-day probabilistic tables from the probabilities calculated by ZSCORP for the total events array. This routine calls DEKODE and DEKODA subroutines. DEKODE splits the time interval date (SDATE and FDATE) into two parts (month and year). Subroutine DEKODA does essentially the same although it is sent an array in I6 format (YYMMDD) and returns the array in the format (MMM YY). Although these routines will execute for all possible time increment selections, they were primarily designed for monthly increments.

3.2.4 Primary Overlay (4,0) PROGRAM PLOT. This routine is a primary overlay. It consists of the program PLOT, seven subroutines, and a function (see Section 5.0, System Diagram).

The SEARCH program provides the graphic display capability to the CEWPS. This program calls subroutines which in turn call the PLOT-10 package from both the TCS and AG-II functions.

After rearranging all the arrays built in Overlay 2,0 in a more readable fashion, the program executes the PLOT-10 INITT command. This command blanks the CRT and

initiates the graphics mode. Immediately, subroutine CHOOSE is called to enter graphics parameters. CHOOSE solicits from the user the number of plots desired, type of plot, and the arrays to be plotted. A matrix is drawn by CHOOSE to provide an association between the arrays constructed in Overlay 2,0 and a unique name or number.

Subroutine PTABLE is called to recalculate probabilities, a necessary step since the plots generated by PLOTIT allow for only one character after the decimal point, whereas TABULAR output specifications require two characters.

Subroutine PLOTIT is then called in a loop from one to six times depending again upon the number of user selections made in subroutine CHOOSE. When the desired number of graphs have been drawn, subroutine TITLE is called to print a title.

If the type of graph drawn is a multi-graph (more than one plot on a single axis), subroutine LGND is called. This subroutine will draw the appropriate line and notate the associated array to which it belongs. There are two other subroutines that are used while in graphics mode and are called by the other subroutines, not the overlay. Subroutine USERS is a routine taken from the PLOT-10 AG II manual (p. 191) and modified slightly. This routine gives the capability of doing a point plot without an axis; in the CEWPS, we use it to display the probability values directly above the bar on a bar-chart or above the point on a graph with an arrow drawn to it.

Subroutine CHCNVT, like USERS, is called by subroutines other than PLOT. This routine takes a text character string of N length and converts it to USASCII code functions for Plot-10(AG II) plotter output. This routine is necessary for all special labeling and titles because Plot-10 will not accept hollerith constants.

When all graphs, labels, titles, and legends are completed, program PLOT exits the graph mode with a call to the PLOT-10 FINITT routine. This routine not only exits in graph mode but ensures that all buffers are dumped. After each graph(s) is drawn, the program reads from input to allow for a pause, and to give the user an opportunity to study the display or make a hard copy of it. Normal continuation involves simply hitting the RETURN key; however, one might also continue through the NUMB function.

NUMB reads the value which is typed in and conducts a table look-up check for a match between that input and any of the array numbers or unique names. If

there is indeed a match, the entire sequence for generating a plot (discussed above) is invoked without going through the CHOOSE subroutine. In effect, it executes a blow-up of the name or numbered array choosen. All possible arrays can be blown-up at this time. Valid responses include:

1 or TOT	6 or CONZ
2 or TOTZ	7 or TEN
3 or COO	8 or TENZ
4 or COOZ	9 or UNC
5 or CON	10 or UNCZ

Finally, program PLOT asks the user if he wishes another plot. A "yes" response will start him at the beginning with the call to CHOOSE, and the matrix of political indicators will appear. A "no" will exit from the overlay and return him to MAIN and to the user commands.

3.2.5 Primary Overlay (5,0) PROGRAM TABULAR. This routine is a primary overlay. It consists of the program TABULAR and one subroutine DEKODE. DEKODE is exactly like subroutine DEKODE in overlay 2,0. It is used to convert SDATE and FDATE to the more readable alpha characters used in the headings.

Program TABULAR produces printed output from the arrays generated in Overlay 2. In order to fit the output onto one CRT page, all tables are in a loop. If the number of rows is greater than 18, the tables are printed in two pages (1 to 18 and 19 to the end).

The first table printed includes output of the number of events, their Z-scores, and probabilities for each of the TOTAL, COOPERATIVE, and CONFLICTUAL activities as well as the increment date. The second table shows the date, TENSION, HREL, and their Z-scores.

The user is now asked if he desires event frequencies. If he answers "yes," TABULAR prints two more tables, the first showing the raw collection of cooperative events, by date, in their ten categories. The second table displays the conflictual events, again by date, in their twelve categories. The overlay then returns to "ANALYZ" (main) and again displays the user commands.

3.3 Future Enhancement

The prototype system will be modified to ensure the greatest possible code optimization. Code inefficiencies were caused solely by stringent deadlines and were not intended or desired. The current utilization of random FORTRAN I/O will be either deleted or improved. The general format of all graphics will be improved. A decision will

also be made as to whether or not to discontinue the use of Plot-10 (AG II) and revert to Plot-10 (TCS) in order to create a more tailored output than can be generated by the AG II package. New statistical indicators will also be incorporated to analyze expanded data bases. In short, the system will soon evolve into a more efficient, more attractive, expanded and highly polished product.

4.0 SAMPLE PROGRAM OUTPUT

***** CRISIS EARLY WARNING PROTOTYPE SYSTEM *****

OVERLAY 0,0

THE CRISIS EARLY WARNING PROTOTYPE SYSTEM WAS DEVELOPED
FOR THE ADVANCED RESEARCH PROJECTS AGENCY'S CYBERNETICS
TECHNOLOGY OFFICE BY DECISIONS AND DESIGNS, INCORPORATED.

THE SYSTEM IS DESIGNED TO SIMULATE HOW QUANTITATIVE
POLITICAL INDICATORS MIGHT HAVE CONTRIBUTED TO THE U.S.
DEFENSE COMMUNITY'S ABILITY TO FORECAST A NUMBER OF IMPORTANT
INTERNATIONAL CRISES. IT IS ALSO DESIGNED TO ILLUSTRATE
HOW THE GENERAL NATURE AND DIRECTION OF INTERNATIONAL AFFAIRS
MAY BE MONITORED USING POLITICAL INDICATORS.

Subroutine
"CREDITS"

OVERLAY 1,0

THE FOLLOWING INTERNATIONAL CRISIS CASES ARE NOW AVAILABLE
ON THE DEMONSTRATION SYSTEM :

1. SINO - SOVIET BORDER CLASHES,
JANUARY , 1967 AND MARCH , 1969
2. CZECHOSLOVAKIAN INVASION,
AUGUST , 1968
3. INDO - PAKISTANI WAR,
NOVEMBER , 1971

THE SYSTEM ALSO CONTAINS THE FOLLOWING OTHER CASES :

4. U.S. - SOVIET UNION,
JANUARY , 1966 - DECEMBER , 1975
5. U.S. - PEOPLES REPUBLIC OF CHINA,
JANUARY , 1966 - DECEMBER , 1975
6. SOVIET UNION - PEOPLES REPUBLIC OF CHINA,
JANUARY , 1966 - DECEMBER , 1975

Subroutine
"CASE"

PLEASE SELECT ONE CASE NUMBER :2

OVERLAY 1,0

*** CZECHOSLOVAKIAN INVASION , AUGUST , 1968 ***

PRIMARY ACTORS :

SOVIET UNION (USR)
CZECHOSLOVAKIA (CZE)

OTHER ACTORS :

UNITED STATES (USA)
PEOPLES REPUBLIC OF CHINA (CHN)

Subroutine
"CZEINV"

PLEASE SELECT TWO ACTORS : (E.G. XXX,YYY)USR,CZE

SPECIFY ACTIVITY FLOW :

- 0. ONE WAY (USR >>> CZE)
- 1. ONE WAY (USR <<< CZE)
- 2. TWO WAY (USR <-> CZE) 2

Subroutine
"SETUP"

SELECT TIME INCREMENT :

- 1. MONTHLY
- 2. QUARTERLY
- 3. YEARLY 1

SET TIME PARAMETERS (JAN66,DEC75) : JAN68-DEC68

Subroutine
"TSETUP"

DO YOU DESIRE 30 DAY PROBABLISTIC FORCASTS (Y OR N) : Y

OVERLAY 2,0

MONTHLY PROBABILITY
JAN, 1968 - DEC, 1968
*** USR <<<>>> CZE ***
DATE PROBABILITY
JAN 68 .10
FEB 68 .50
MAR 68 .70
APR 68 .70
MAY 68 .80
JUN 68 .40
JUL 68 .70
AUG 68 .60
SEP 68 .40
OCT 68 .05
NOV 68 .01
DEC 68 .01

Subroutine
"SMLTAB"

OVERLAY 0,0

*** USER COMMANDS ***

CASE COMMANDS:

I = PLOT INSTRUCTIONS
G = GRAPHICAL OUTPUT
T = TABULAR OUTPUT
F = FLOW SELECTION
A = ACTOR SELECTION

OTHER COMMANDS:

C = CRISIS CASES
E = END EXECUTION

SPECIFY USER COMMAND:

OVERLAY 0,0

*** PLOTTER INSTRUCTIONS ***

UPON INITIAL ENTRY INTO THE GRAPHICS SECTION, THE POLITICAL INDICATOR MATRIX WILL BE DISPLAYED. THIS MATRIX DESCRIBES EACH PLOT AVAILABLE TO THE USER AND IS NUMBERED ONE THROUGH TEN (TEN POSSIBLE PLOTS).

IT IS THE USERS DECISION WHICH PLOTS ARE TO BE DISPLAYED, HOW MANY, WHAT PLOT TYPE (BAR OR GRAPH), AND THE DESIRED POSITION ON THE CRT. THE FOLLOWING ARE VALID RESPONSES TO QUERIES WHICH IMMEDIATELY FOLLOW THE INDICATOR MATRIX:

- 1) DO YOU WANT MORE THAN ONE PLOT PER GRAPH (Y OR N)
- THE 'Y' (YES) ANSWER WILL PROVIDE THE USER WITH CHOICES AVAILABLE FOR MORE THAN ONE GRAPH PLOTTED ON A SINGLE PAIR OF AXIS.
- THE 'N' (NO) ANSWER WILL LEAD THE USER THROUGH A GROUP OF QUESTIONS THAT WILL ALLOW HIM TO GENERATE FROM ONE TO SIX SIMULTANEOUS PLOTS, EACH HAVING ITS OWN AXIS.

Subroutine
"INSTRNS"

OVERLAY 0,0

AFTER ANY GRAPH IS DISPLAYED THE SYSTEM AWAITS THE INPUT OF
A 'RETURN' TO CONTINUE.

- OR -

THE USER MAY SPECIFY ANY OF THE FOLLOWING PLOT NAMES OR
NUMBERS TO CREATE A BLOW-UP OF AN INDIVIDUAL GRAPH.

1	OR	TOT	6	OR	CONZ
2	OR	TOTZ	7	OR	TEN
3	OR	COO	8	OR	TENZ
4	OR	COOZ	9	OR	UNC
5	OR	CON	10	OR	UNCZ

Subroutine
"INSTRNS"

2) ANOTHER DISPLAY (Y OR N)

--THE 'Y' (YES) ANSWER WILL CAUSE THE INDICATOR MATRIX TO BE
RE-DRAWN.

--THE 'N' (NO) ANSWER WILL TERMINATE THIS OVERLAY AND
RE-INITIATE THE 'SPECIFY USER COMMAND' SECTION.

OVERLAY 4.0

POLITICAL INDICATORS

	TOTAL ACTIVITY	COOP ACTIVITY	CONFLICT ACTIVITY	TENSION LEVEL	UNCERT LEVEL
RAW DATA	1	3	5	7	9
Z-SCORE	2	4	6	8	10

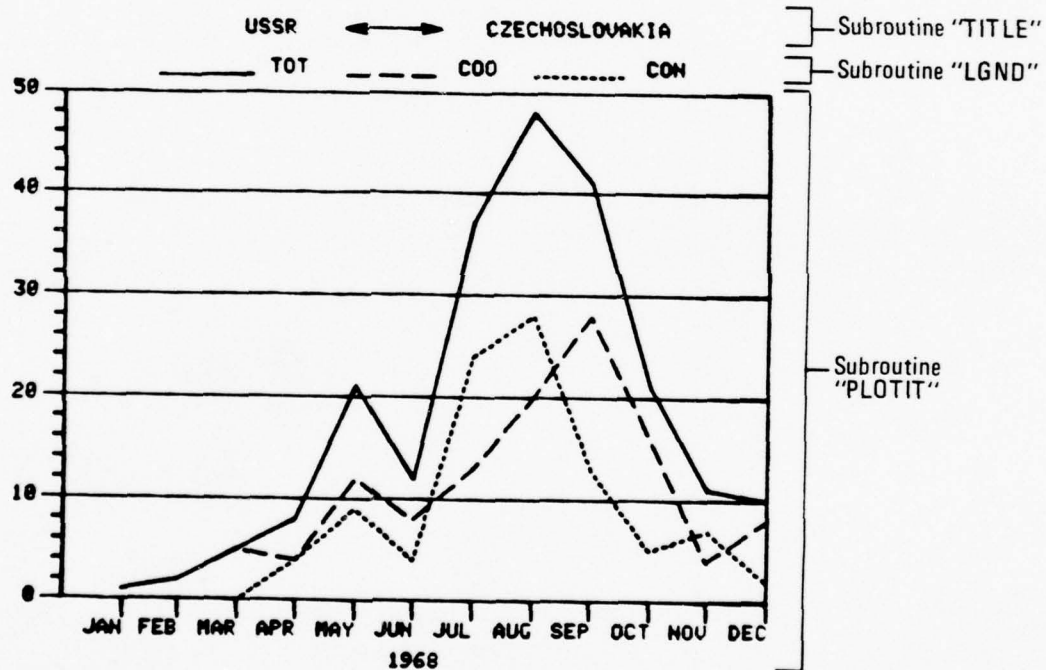
Subroutine
"CHOOSE"

DO YOU WANT MORE THAN ONE PLOT PER GRAPH (Y OR N) Y
YOU HAVE THESE CHOICES:

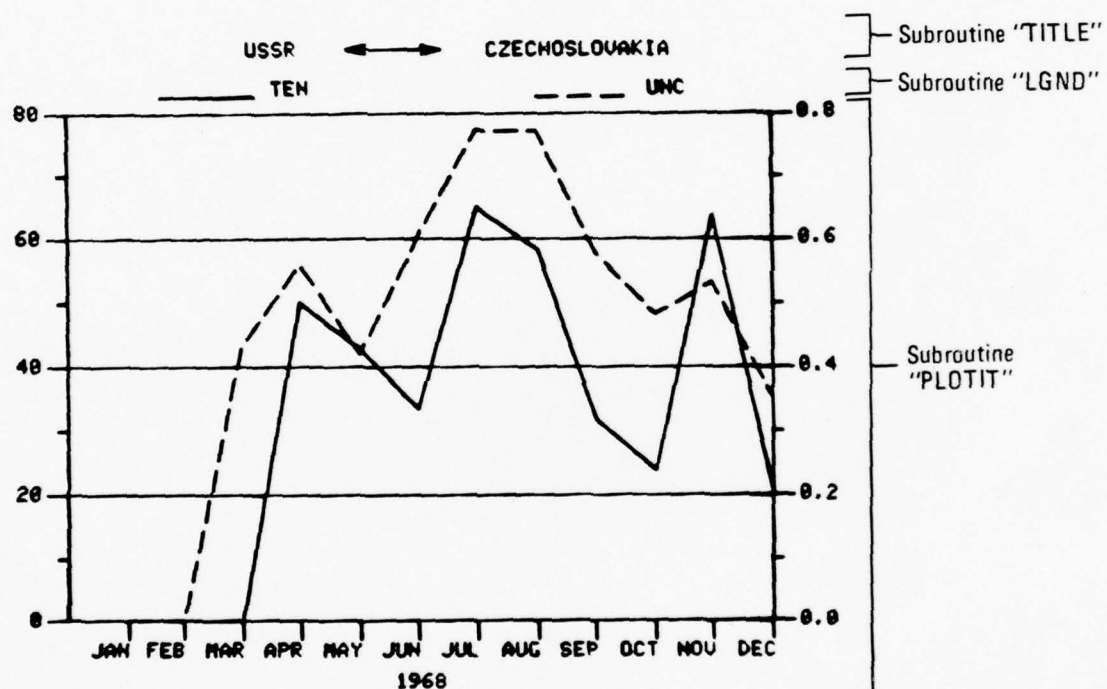
- 1 = GRAPHS 1, 3 + 5
- 2 = GRAPHS 2, 4 + 6
- 3 = GRAPHS 7 + 9
- 4 = GRAPHS 8 + 10

PLEASE PICK ONE 1

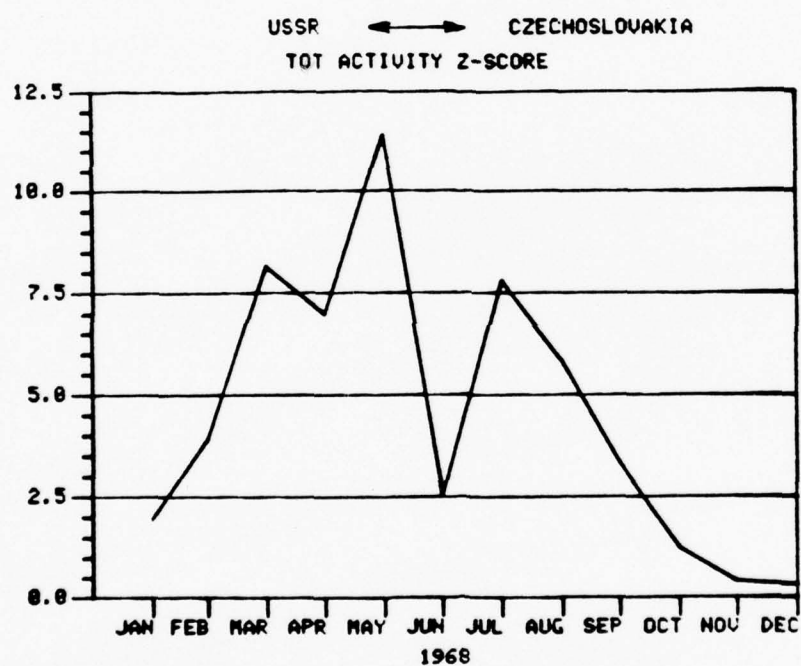
OVERLAY 4,0



OVERLAY 4,0



OVERLAY 4.0



Subroutine "TITLE"

Subroutine
"PLOTIT"

OVERLAY 4,0

POLITICAL INDICATORS

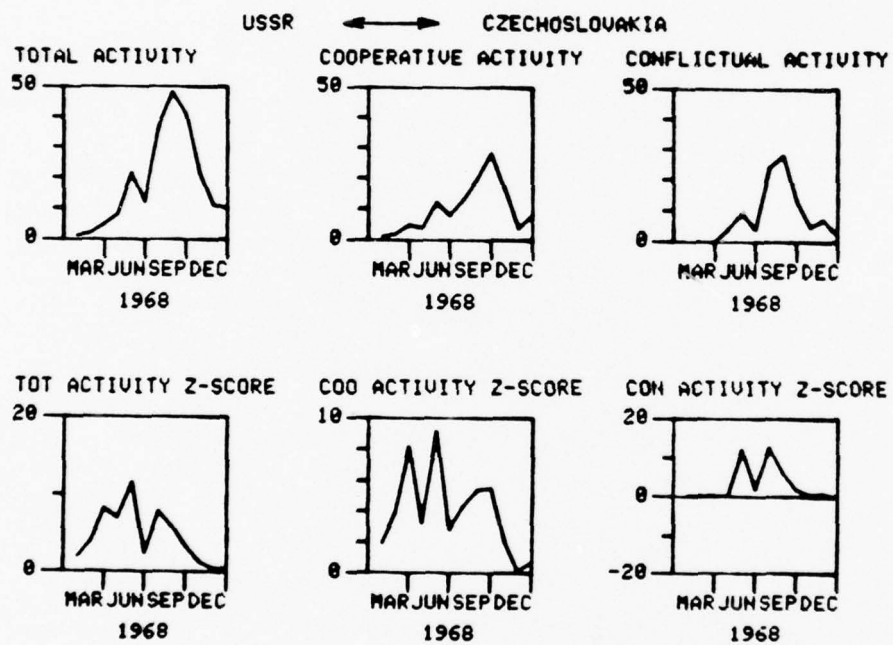
	TOTAL ACTIVITY	COOP ACTIVITY	CONFLICT ACTIVITY	TENSION LEVEL	UNCERT LEVEL
RAW DATA	1	3	5	7	9
Z-SCORE	2	4	6	8	10

Subroutine
"CHOOSE"

DO YOU WANT MORE THAN ONE PLOT PER GRAPH (Y OR N) N
DO YOU WANT GRAPHS OR BAR-CHARTS (G OR B) G
HOW MANY GRAPHS DO YOU WANT (1-6) 6

PLEASE TYPE IN THE 6 GRAPH NUMBERS YOU
WOULD LIKE DISPLAYED IN THE FORM (1,2, ... 6) 1 2 3 4 5 6

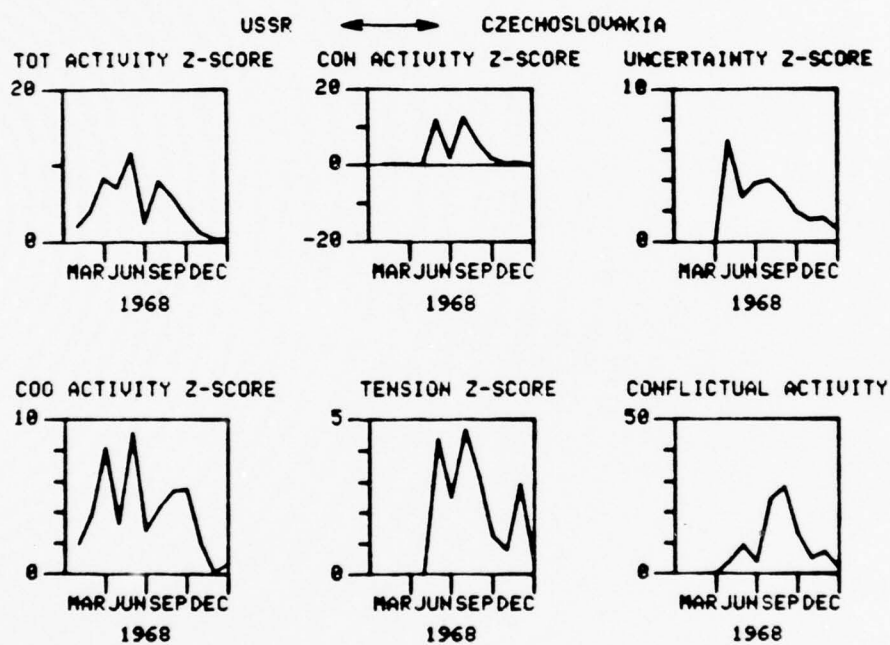
OVERLAY 4,0



Subroutine "TITLE"

Subroutine
"PLOTIT"

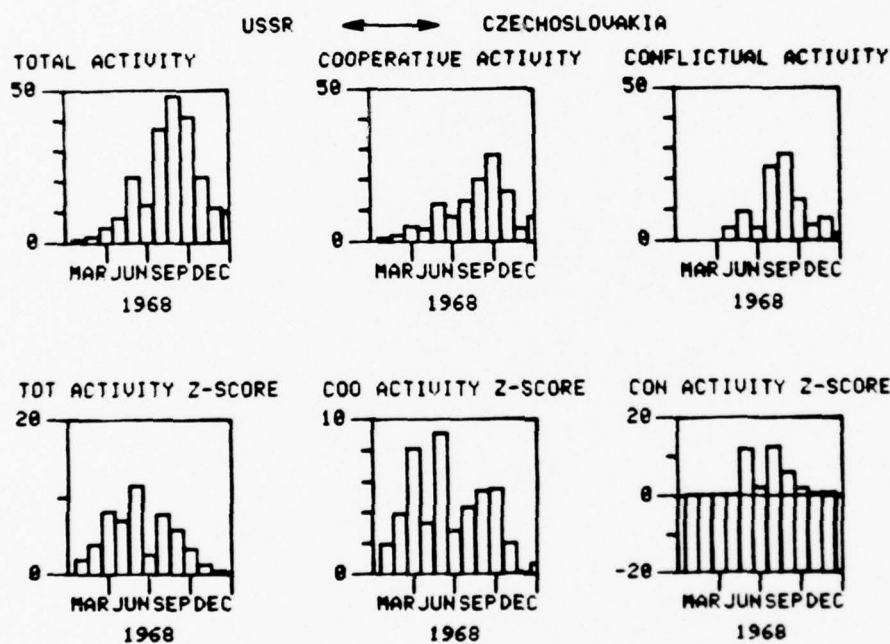
OVERLAY 4,0



Subroutine "TITLE"

Subroutine
"PLOTIT"

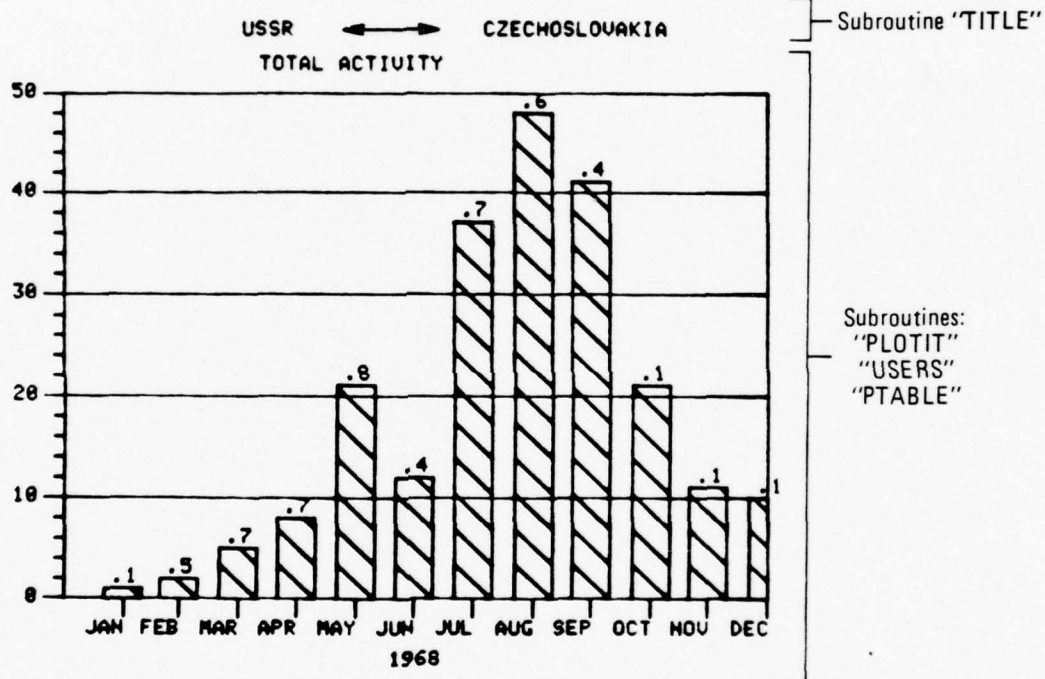
OVERLAY 4,0



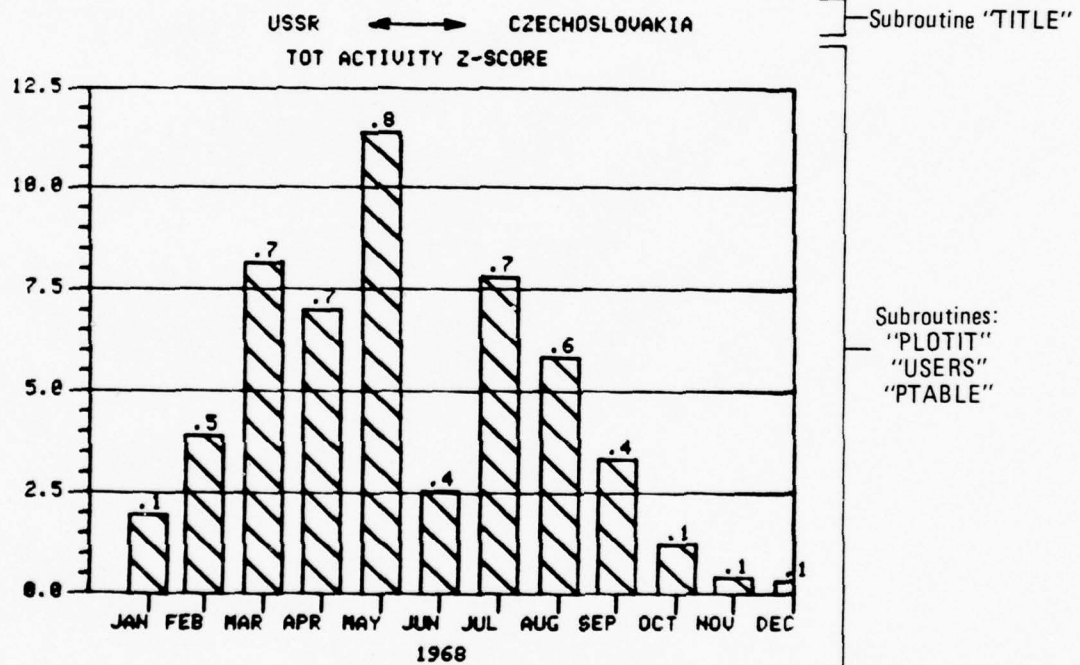
Subroutine "TITLE"

Subroutine
"PLOTIT"

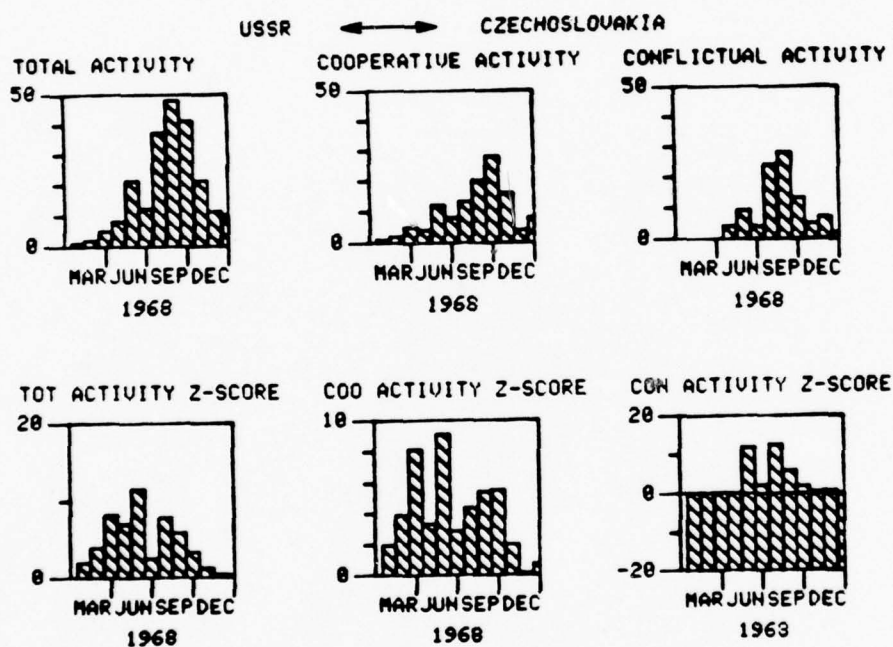
OVERLAY 4,0



OVERLAY 4,0



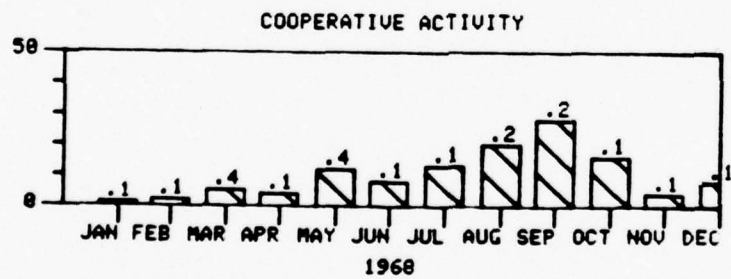
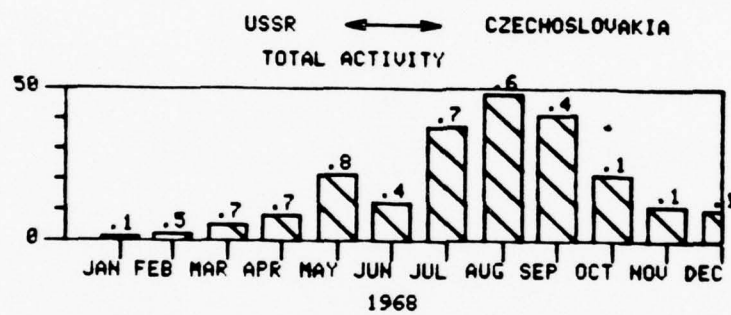
OVERLAY 4.0



Subroutine "TITLE"

Subroutine
"PLOTIT"

OVERLAY 4,0



Subroutine "TITLE"

Subroutines:
"PLOTIT"
"USERS"
"PTABLE"

OVERLAY 5,0

MONTHLY ACTIVITY
JAN, 1968 - DEC, 1968

*** USR <<<<< TWO-WAY FLOW >>>>> CZE ***

DATE	TOTAL NUMBER	ACTIVITY Z-SCORE	PROB	COOPERATIVE NUMBER	ACTIVITY Z-SCORE	PROB	CONFLICTUAL NUMBER	ACTIVITY Z-SCORE	PROB
JAN 68	1	1.95	.10	1	1.95	.01	0	0.00	.01
FEB 68	2	3.89	.50	2	3.89	.10	0	0.00	.01
MAR 68	5	8.12	.70	5	8.12	.40	0	0.00	.01
APR 68	8	7.01	.70	4	3.32	.05	4	0.00	.01
MAY 68	21	11.38	.80	12	9.09	.40	9	11.72	.80
JUN 68	12	2.55	.40	8	2.87	.05	4	1.97	.10
JUL 68	37	7.79	.70	13	4.31	.10	24	12.41	.80
AUG 68	48	5.83	.60	20	5.37	.20	28	5.80	.60
SEP 68	41	3.33	.40	28	5.51	.20	13	1.66	.10
OCT 68	21	1.24	.05	16	2.03	.01	5	.38	.01
NOV 68	11	.41	.01	4	.10	.01	7	.67	.05
DEC 68	10	.32	.01	8	.71	.01	2	-.10	.01

OVERLAY 2,0

Subroutine
"DEKODE"

Subroutine
"PTABLE"

Subroutine
"ZSCORP"

Subroutine
"PTABLE"

Subroutine
"ZSCORP"

Subroutine
"PTABLE"

Subroutine
"ZSCORP"

Subroutine
"DEKODA"

OVERLAY 5,0

MONTHLY TENSION AND UNCERTAINTY
JAN, 1968 - DEC, 1968

Subroutine "DEKODE"

*** USR <<<<< TWO-WAY FLOW >>>>> CZE ***

OVERLAY 2,0

DATE	TENSION	Z-SCORE	H-REL	Z-SCORE
JAN 68	0.0	0.00	0.000	0.00
FEB 68	0.0	0.00	0.000	0.00
MAR 68	0.0	0.00	.431	0.00
APR 68	50.0	0.00	.561	6.57
MAY 68	42.9	4.35	.420	2.93
JUN 68	33.3	2.51	.603	3.76
JUL 68	64.9	4.66	.774	4.00
AUG 68	58.3	3.10	.772	3.17
SEP 68	31.7	1.26	.579	1.92
OCT 68	23.8	.80	.483	1.41
NOV 68	63.6	2.88	.531	1.54
DEC 68	20.0	.45	.352	.78

Subroutine "ZSCORP"

Subroutine "HREL"

Subroutine "ZSCORP"

Subroutine "TENSION"

Subroutine "DEKODA"

OVERLAY 5,0

MONTHLY COOPERATIVE ACTIVITY
JAN, 1968 - DEC, 1968

Subroutine "DEKODE"

*** USR <<<<< TWO-WAY FLOW >>>>> CZE ***

DATE	YLD	CMNT	CNSL	APPR	PRMS	GRNT	REWD	AGRE	RQST	PROP
JAN 68	0	0	0	1	0	0	0	0	0	0
FEB 68	0	0	2	0	0	0	0	0	0	0
MAR 68	0	1	2	1	1	0	0	0	0	0
APR 68	0	0	2	1	0	0	1	0	0	0
MAY 68	0	1	10	1	0	0	0	0	0	0
JUN 68	0	0	2	1	3	0	0	2	0	0
JUL 68	2	0	6	1	1	0	0	0	2	1
AUG 68	3	0	6	2	2	0	0	6	0	1
SEP 68	3	1	10	0	0	1	0	4	1	0
OCT 68	1	1	12	0	0	1	0	0	1	0
NOV 68	0	0	0	0	0	1	0	2	1	0
DEC 68	0	0	6	0	0	1	1	0	0	0

OVERLAY 2,0

Subroutine "DEKODA"

OVERLAY 5,0

MONTHLY CONFLICTUAL ACTIVITY
JAN, 1968 - DEC, 1968

*** USR <<<<< TWO-WAY FLOW >>>>> CZE ***

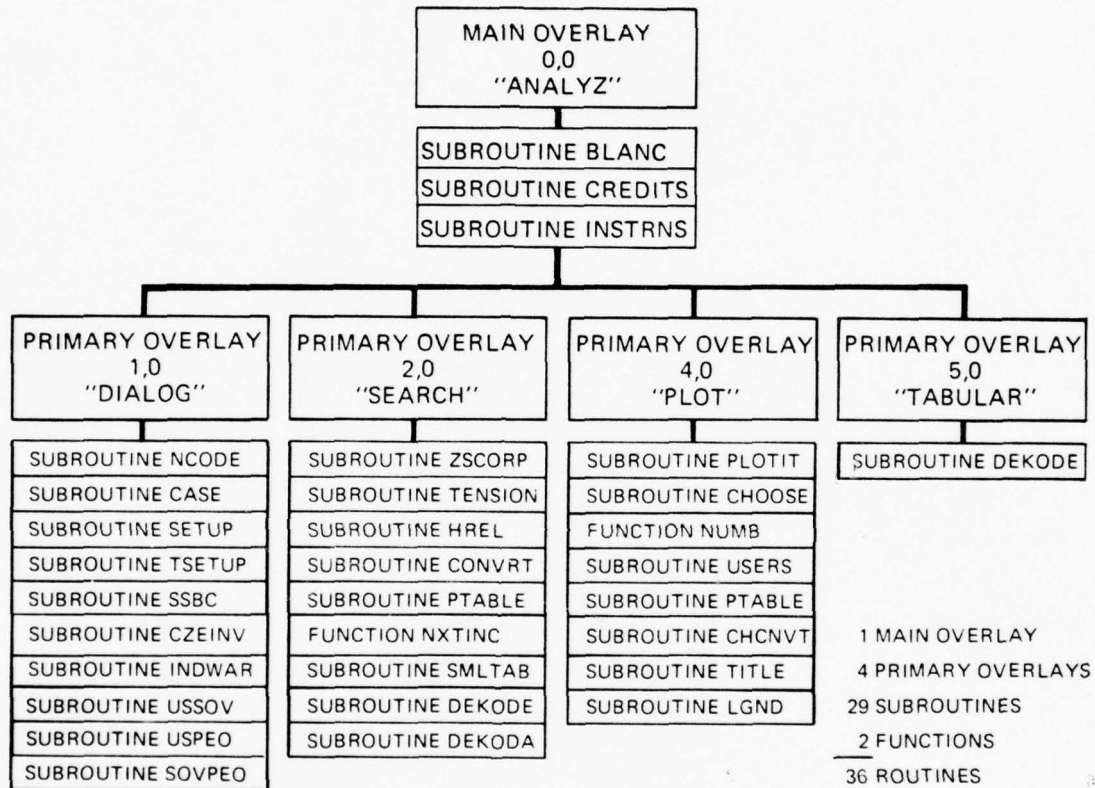
Subroutine "DEKODE"

OVERLAY 2,0

DATE	RJCT	ACUS	PROT	DENY	DMND	WARN	THRT	DEMO	RDUC	EXPL	SEIZ	FRCE
JAN 68	0	0	0	0	0	0	0	0	0	0	0	0
FEB 68	0	0	0	0	0	0	0	0	0	0	0	0
MAR 68	0	0	0	0	0	0	0	0	0	0	0	0
APR 68	0	2	0	0	0	1	0	0	1	0	0	0
MAY 68	0	7	0	1	0	1	0	0	0	0	0	0
JUN 68	0	1	1	2	0	0	0	0	0	0	0	0
JUL 68	3	0	1	1	4	2	0	3	2	0	0	0
AUG 68	1	12	1	1	2	2	1	4	0	0	4	0
SEP 68	0	0	1	0	2	0	0	0	1	0	1	0
OCT 68	0	2	0	0	2	0	0	1	0	0	0	0
NOV 68	0	4	0	0	0	0	0	0	0	0	0	1
DEC 68	0	2	0	0	0	0	0	0	0	0	0	0

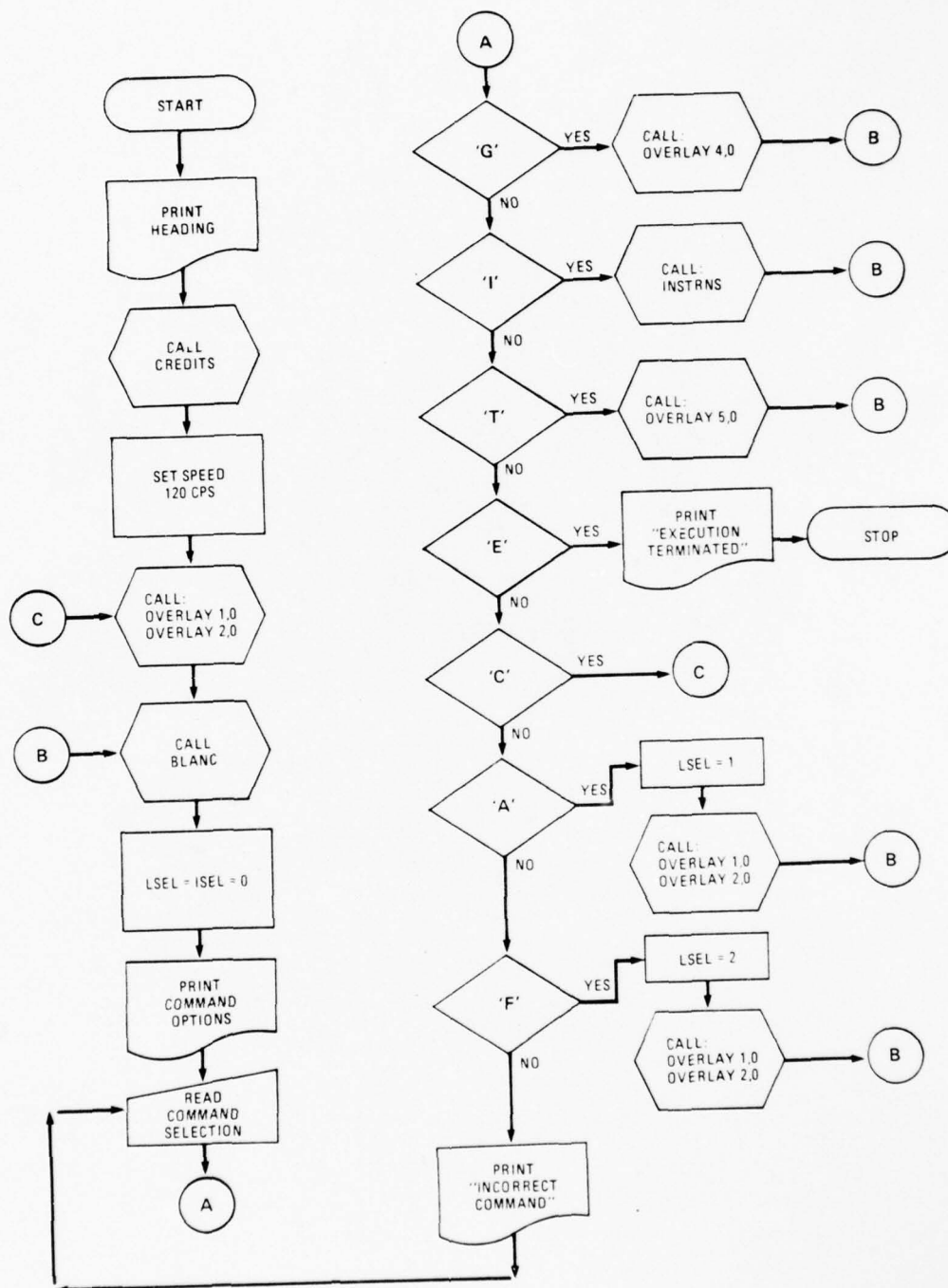
Subroutine "DEKODA"

5.0 SYSTEM DIAGRAM

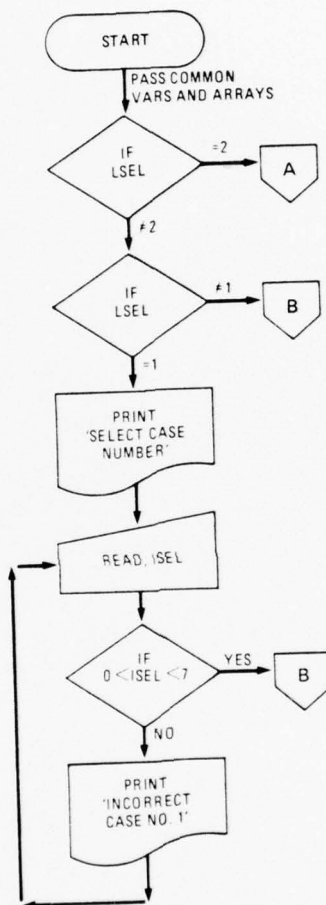


**CRISIS EARLY WARNING PROTOTYPE SYSTEM
SEPTEMBER, 1976**

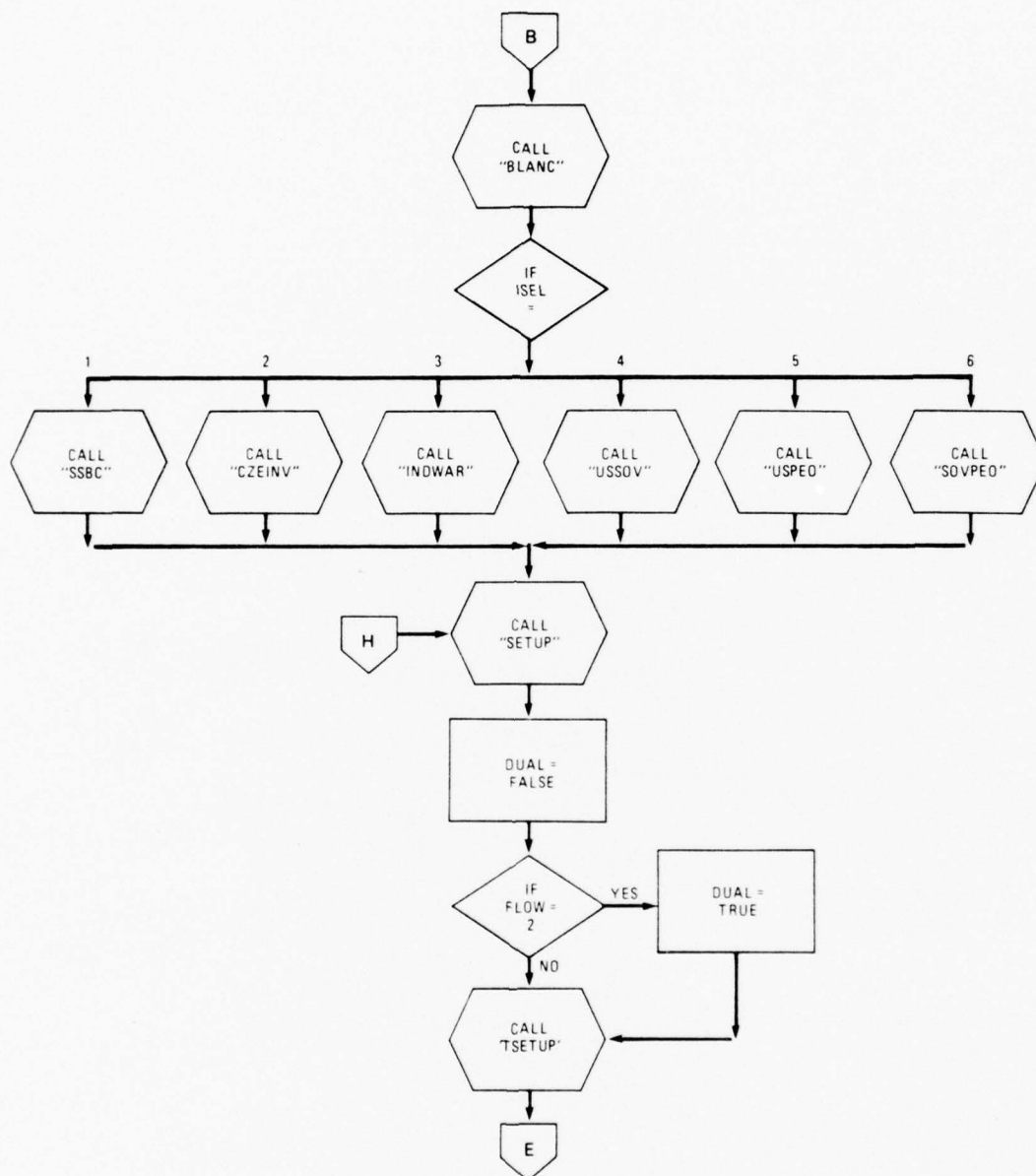
6.0 SYSTEM FLOW CHARTS



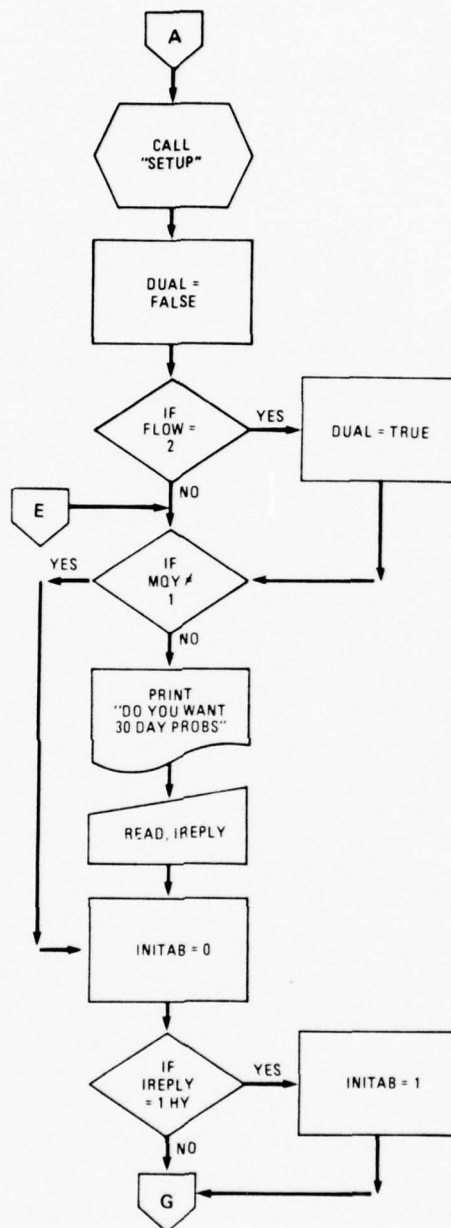
OVERLAY 0,0 (Main) "ANALYZ"



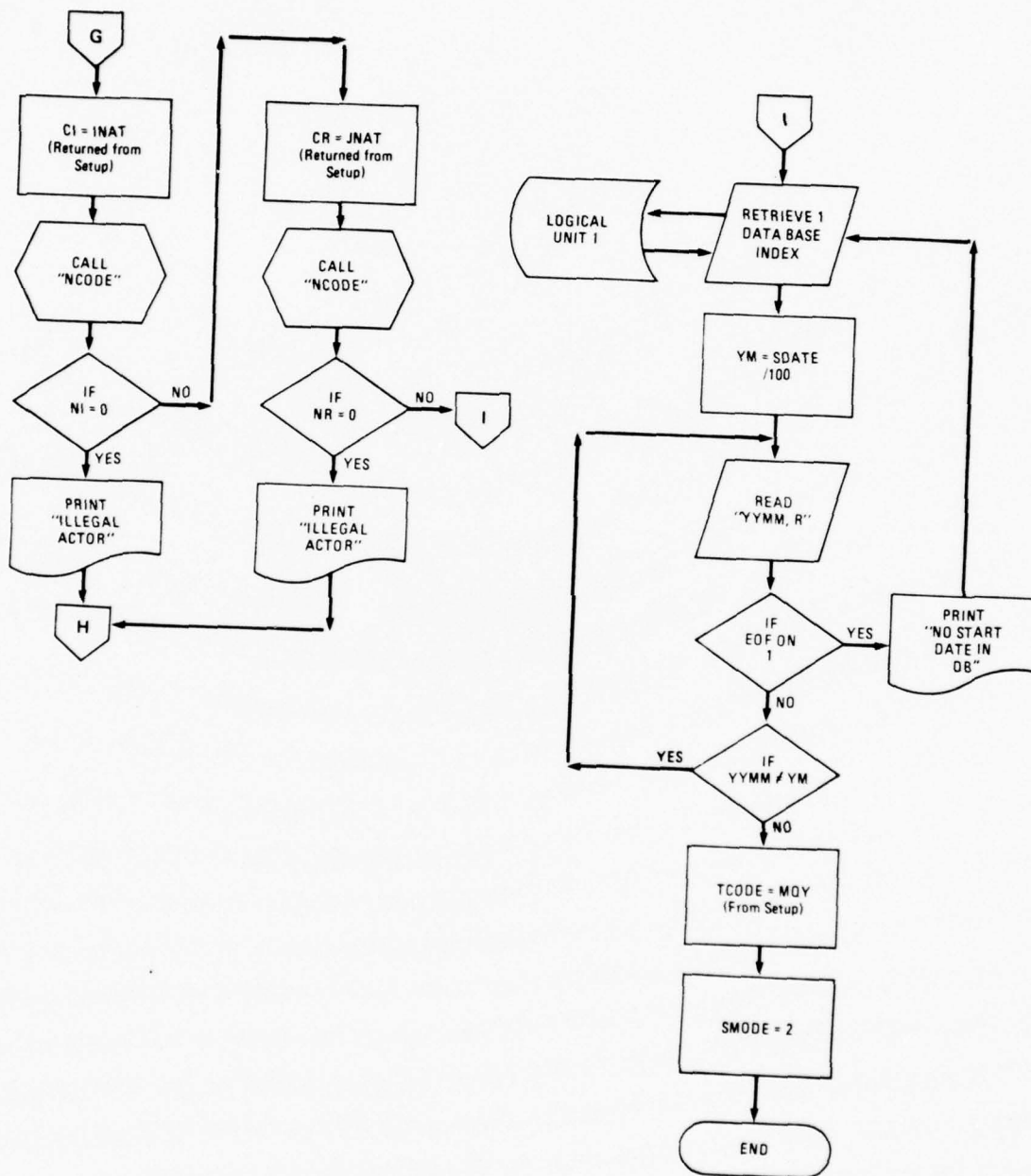
OVERLAY 1,0 (Primary) "DIALOG"



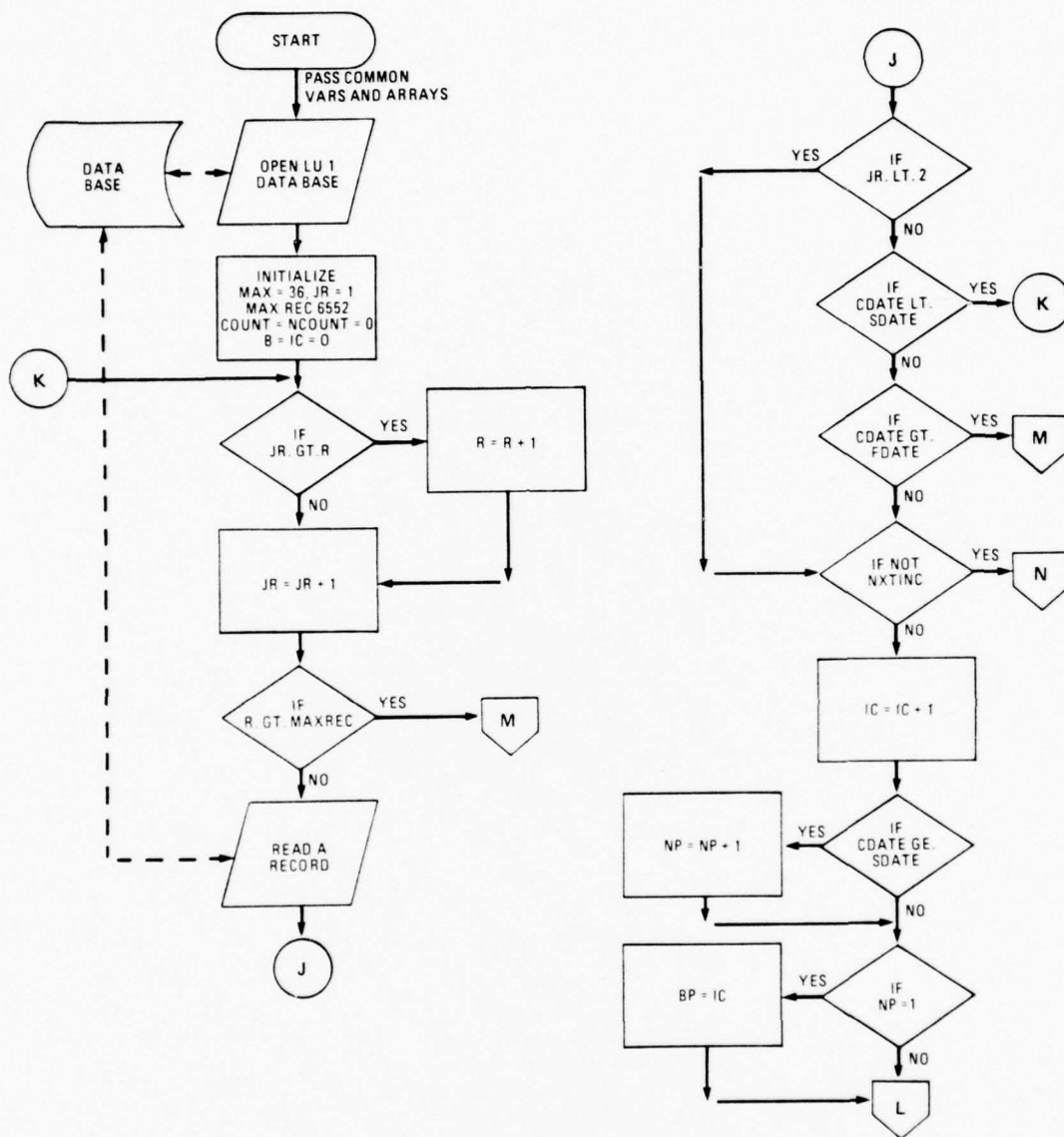
OVERLAY 1,0 (cont.)



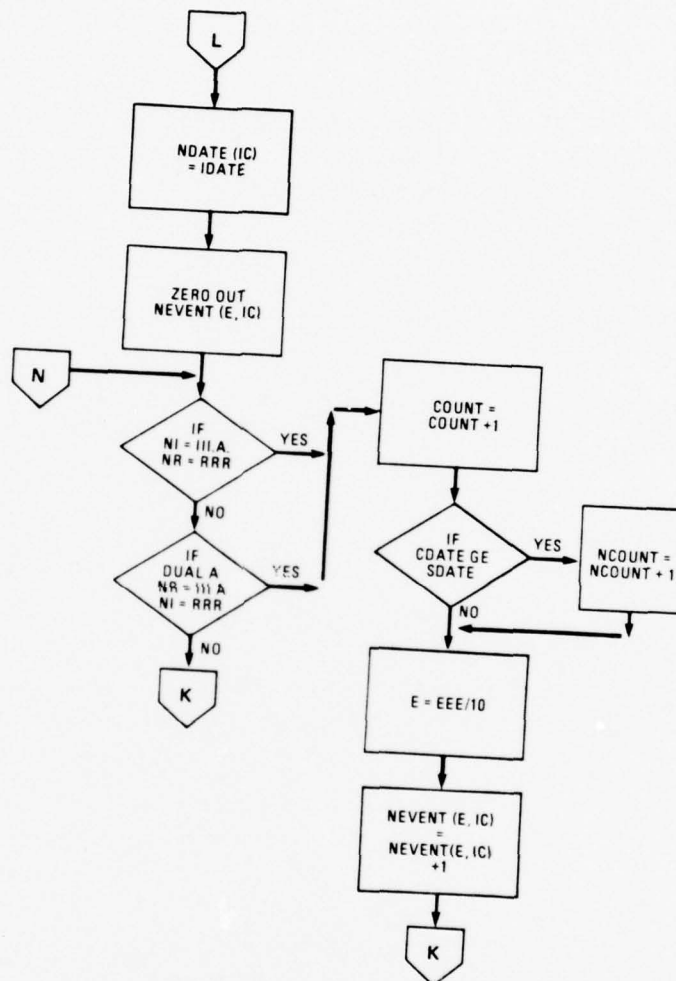
OVERLAY 1,0 (cont.)



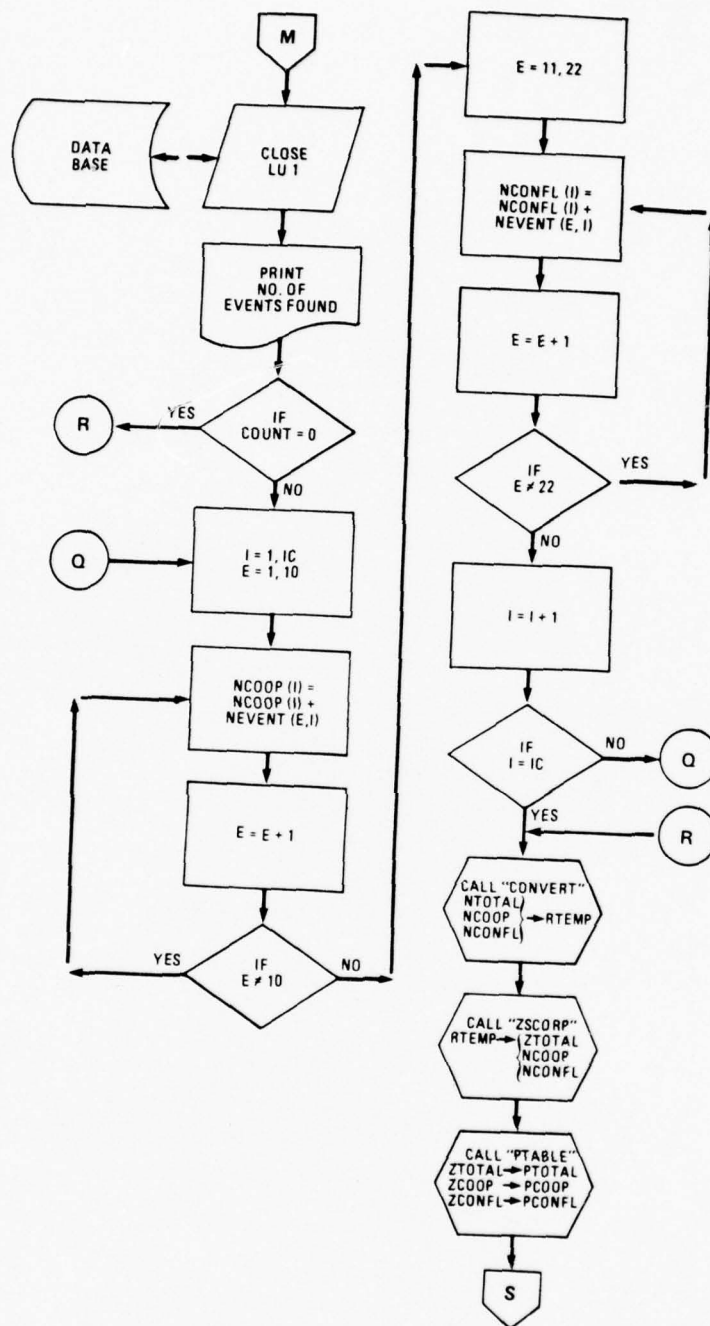
OVERLAY 1,0 (cont.)



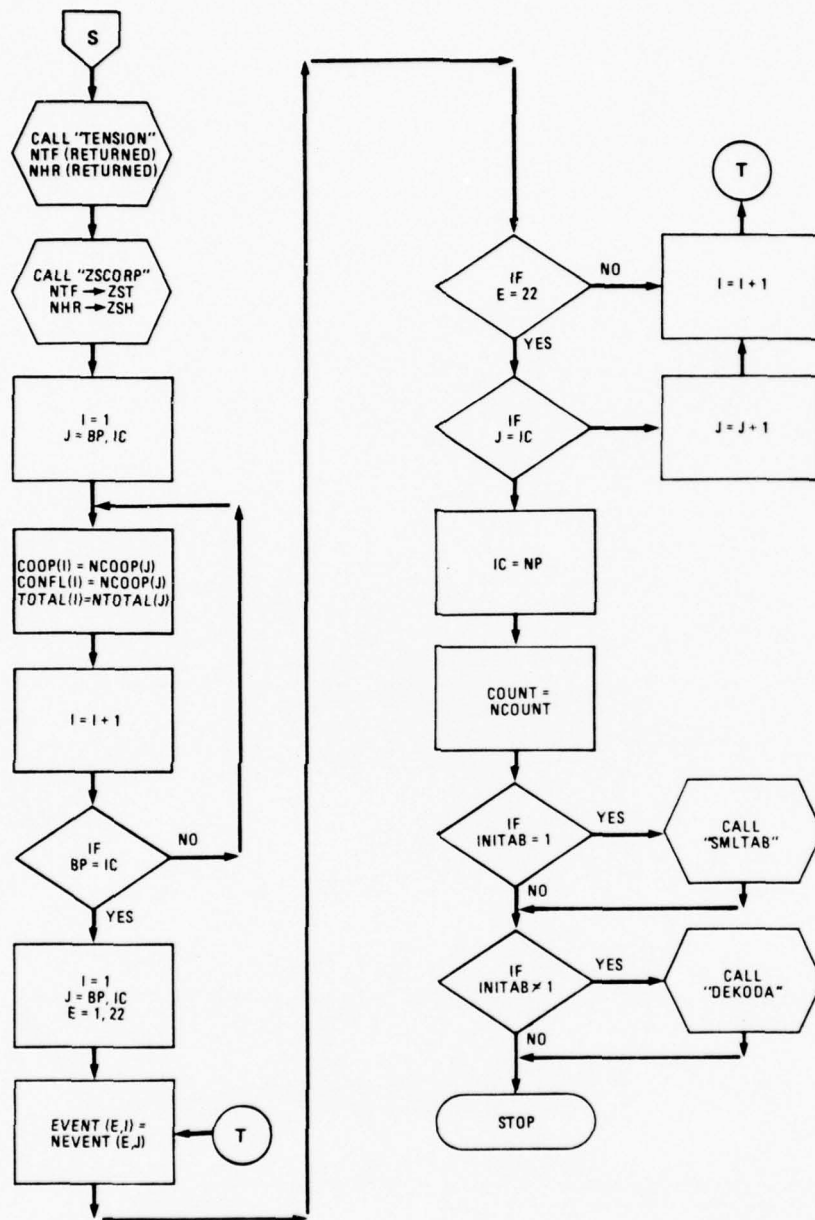
OVERLAY 2,0 (Primary) "SEARCH"



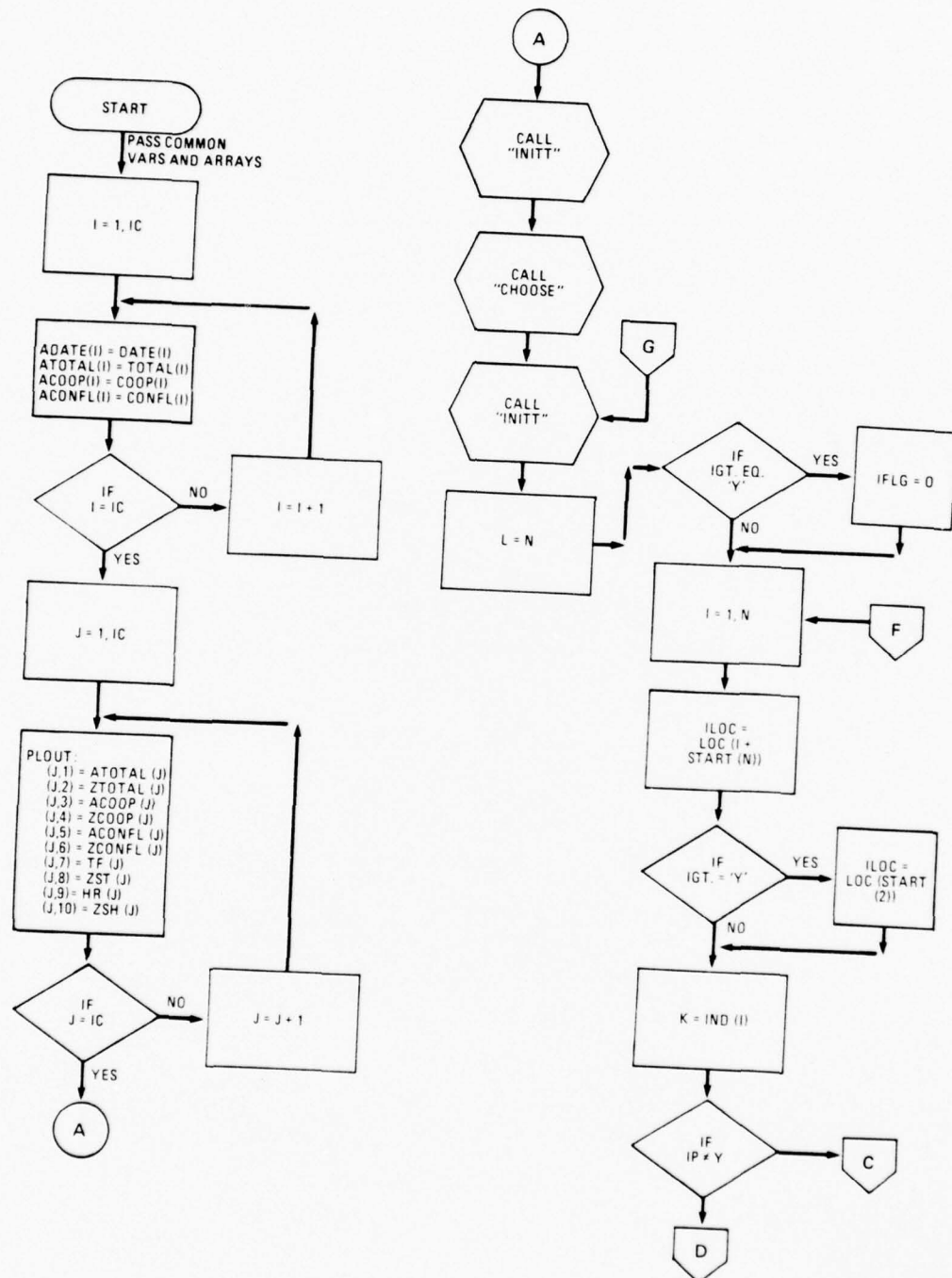
OVERLAY 2,0 (cont.)



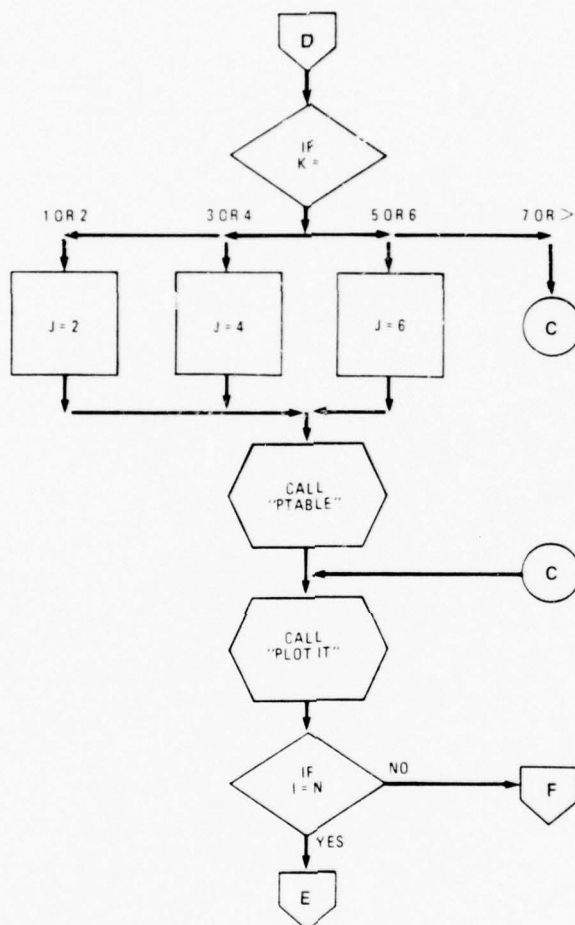
OVERLAY 2,0 (cont.)



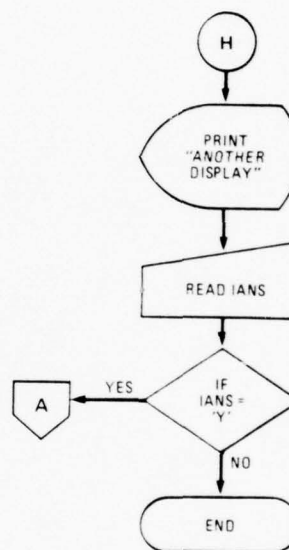
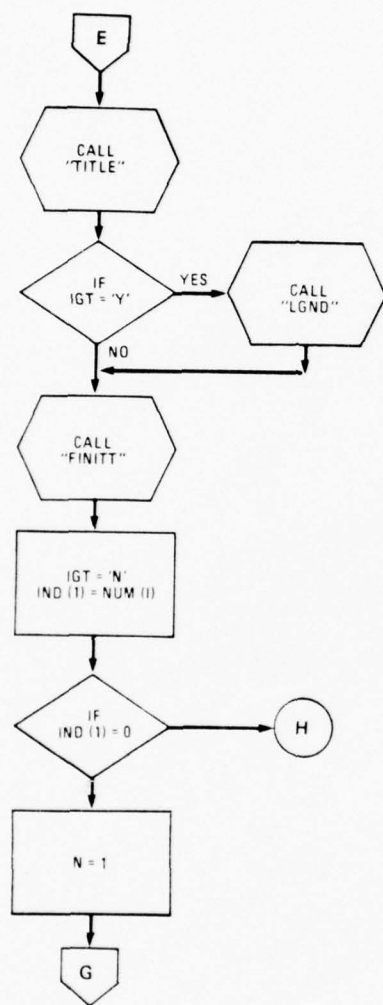
OVERLAY 2,0 (cont.)



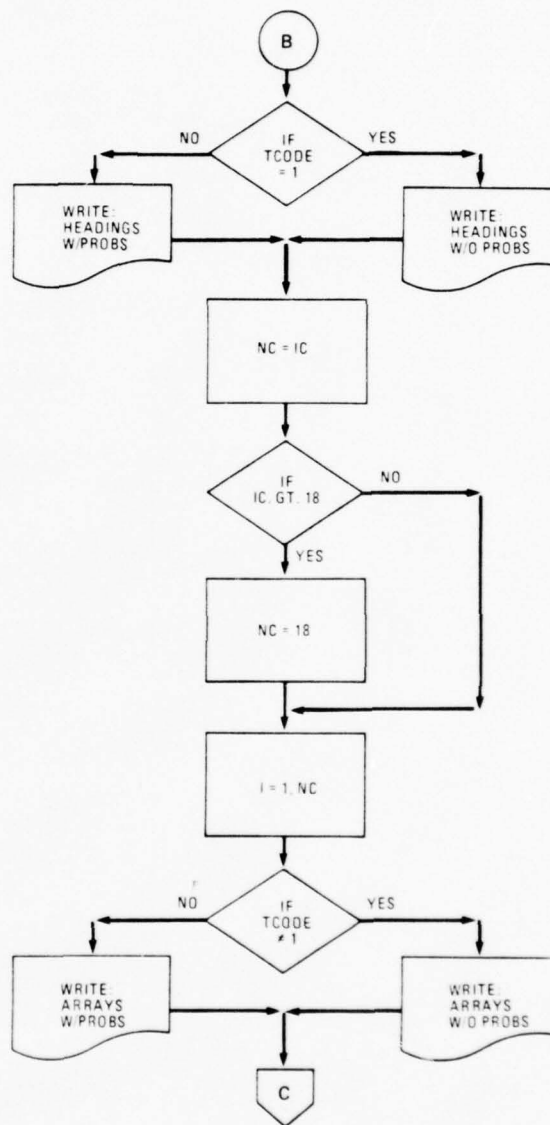
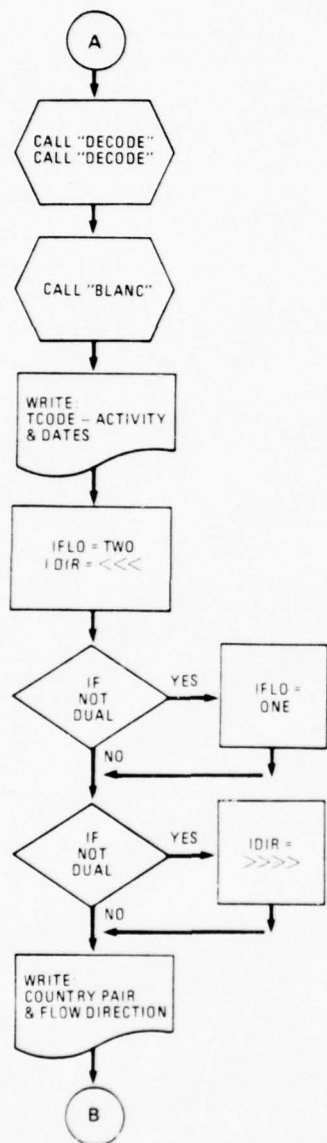
OVERLAY 4,0 (Primary) "PLOT"



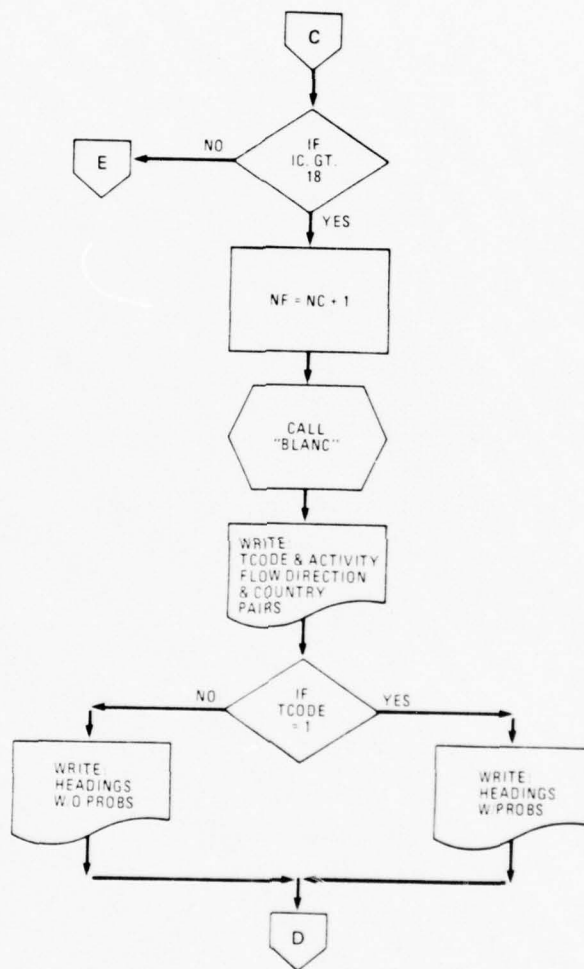
OVERLAY 4.0(cont.)



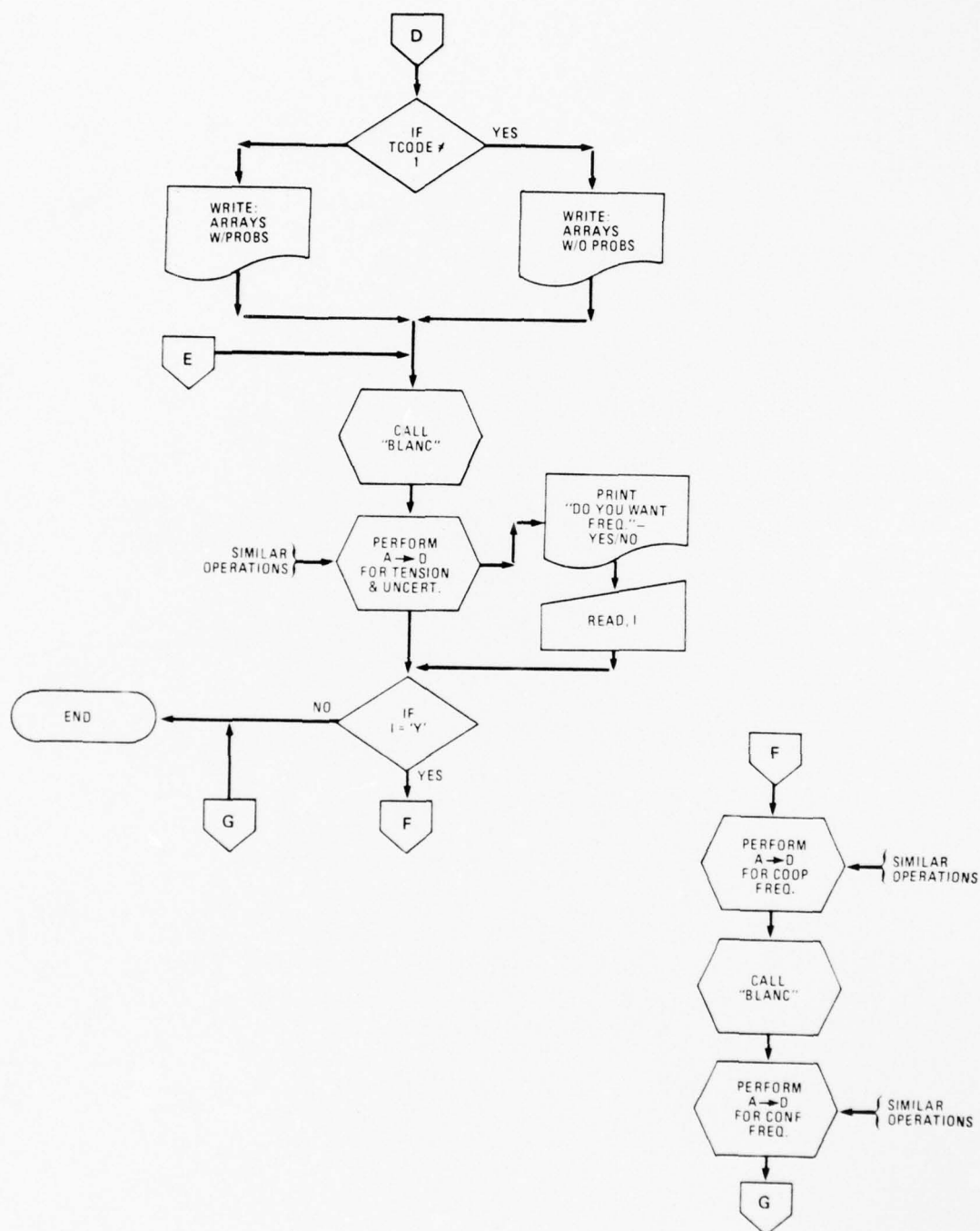
OVERLAY 4,0 (cont.)



OVERLAY 5,0 (Primary) "TABULAR"



OVERLAY 5,0 (cont.)



OVERLAY 5,0 (cont.)

7.0 DOCUMENTED FORTRAN SOURCE CODE

```

00100      OVERLAY(OURLAY,0,0)
00110C
00120C      AUTHORS:  L.S.RANDALL (ORIGINAL CODE)
00130C                  J.J.ALLEN  (OVERLAY 4,0) ORIG.
00140C                  J.F. WITTMAYER (MODIFICATIONS)
00150C
00160C      MAIN OVERLAY CALLS FOUR PRIMARIES
00170C          1. OVERLAY 1,0 - PARAMETER ENTRY + NATION CHECK
00180C          2. OVERLAY 2,0 - DB READ, ARRAY CALCULATIONS
00190C          3. OVERLAY 4,0 - ALL GRAPHICS
00200C          4. OVERLAY 5,0 - TABULAR O/P
00210C
00220C
00230C
00240C      SUBROUTINE CALLS IN MAIN OVERLAY
00250C          1) BLANC - UNIVERSAL ROUTINE TO CLEAR PAGE ON 4051
00260C          2) CREDITS - ROUTINE DISPLAYS PROGRAMMERS PURPOSE
00270C          3) INSTRNS - ROUTINE (SHOULD NOT BE IN MAIN) GIVES A QUICK
00280C                     DESCRIPTION OF HOW OVERLAY 4,0 WORKS...
00290C
00300C
00310      PROGRAM ANALYZ(INPUT,OUTPUT,TAPE5=INPUT,TAPE6=OUTPUT,
00320+      TAPE1,TAPE45=OUTPUT)
00330C
00340C      OBJECTIVE:  TO TABULATE THE FREQUENCY, TENSION, H-REL, AND
00350C                  Z-SCORES OF EVENTS BETWEEN TWO COUNTRIES OVER A SPECIFIED
00360C                  SPAN OF TIME BY DAY, MONTH, QUARTER, HALF-YEAR OR YEAR.
00370C
00380C      WEIS DATA ARE MAINTAINED IN A DIRECT ACCESS FILE (RUSC)
00390C      WITH RECORDS OF 18 CHARS EACH:
00400C          YYMMDDIIIEERRRAAA
00410C              WHERE
00420C          YYMMDD - DATE
00430C
00440C          III      - INITIATOR
00450C          EEE      - EVENT
00460C          RRR      - RECIPIENT
00470C          AAA      - ARENA
00480C
00490C      A MONTH INDEX FILE (USCINDX) FOR THE WEIS DATA IS FORMATTED
00500C      AS A SEQUENTIAL FILE WITH RECORDS OF 18 CHARS EACH:
00510C          YYMM XXXXX
00520C              WHERE
00530C          YYMM - YEAR + MONTH
00540C          XXXXX - INDEX (RECORD NO) OF FIRST RECORD IN RUSC WHICH
00550C                  INVOLVES THE GIVEN YEAR + MONTH.
00560C
00570C      COMMON LAYOUT
00580C      PARAM ---
00590C      CI = 'CHARACTER' INITIATOR
00600C      NI = ALPHA INITIATOR (3CHRS)
00610C      ADI = 3 WD ALPHA INITIATOR
00620C      CR = 'CHARACTER' RECIPIENT 3 CHRS
00630C      NR = ALPHA RECIPIENT 3-CHRS
00640C      ADR = 3 WD ALPHA RECIPIENT
00650C      DUAL = FLOW DIRECTION 1=2-WAY, 0=ONE WAY
00660C      SDATE = I6 START DATE
00670C      FDATE = I6 FINAL DATE
00680C      TCODE = TIME INCREMENT (MONTH,QTR,YR)
00690C      SMODE = Z-SCORE MODE (PROGRESSIVE = 2)
00700C      R = ADDRESS OF BEGINNING SECTOR OF SDATE ON D.B.
00710C      ISPEED = BAUD RATE FOR PLOT-10 (1200)
00720C      INITAB = FLAG FOR 30 DAY PROBABILITIES 1=YES,2=NO
00730C
00740      IMPLICIT INTEGER(A-Z)
00750C      DELTA=CDATE/100-IDATE/100
00760C
00770      COMMON /PARAM/ CI,NI,ADI(3),CR,NR,ADR(3),DUAL,

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00780+      SDATE,FDATE,TCODE,SMODE,R,ISPEED,INITAB
00790      COMMON /RESLT/ COUNT,IC,DATE(36),EVENT(22,36),
00800+      COOP(36),CONFL(36),TOTAL(36),ATOTAL(36),
00810+      ZTOTAL(36),ACOO(36),ZCOOP(36),ACONFL(36),
00820+      ZCONFL(36),TF(36),ZST(36),HR(36),ZSH(36),
00830+      PTOTAL(36),PCOOP(36),PCONFL(36),RDATE(36)
00840C
00850C      COMMON LAYOUT
00860C      RESULT--
00870C      COUNT = NUMBER OF EVENTS FOUND
00880C      IC = NUMBER OF ARRAY ELEMENTS FILLED
00890C      DATE = 16 DATES FROM SDATE TO FDATE
00900C      EVENTS = 22X36 TOTAL EVENT CELLS
00910C      COOP,ACOO = COOPERATIVE EVENTS ARRAY INTEGER + REAL
00920C      CONFL,ACONFL = CONFLICTIVE EVENTS ARRAY INTEGER + REAL
00930C      TOTAL,ATOTAL = TOTAL EVENTS ARRAY INTEGER + REAL
00940C      ZCOOP,ZCONFL,ZTOTAL = Z-SCORE DATA ARRAYS
00950C      PCOOP,PCONFL,PTOTAL = PROBABILITY ARRAYS
00960C      TF = TENSION RAW DATA ARRAY
00970C      ZST = TENSION Z-SCORE ARRAY
00980C      HR = HREL RAW DATA ARRAY
00990C      ZSH = HREL Z-SCORE ARRAY
01000C      RDATE = ARRAY CONTAINING (DD MMM) DATES
01010C
01020      COMMON/POINT/BP,LSEL,ISEL
01030C
01040C      COMMON LAYOUT
01050C      POINT--
01060C      BP = BEGINNING POINT EQUAL TO IC(1)
01070C      LSEL = FLOW SELECTION 1=ACTORS,2=FLOWS
01080C      ISEL = CASE NUMBER SELECTION
01090C
01100      COMMON /CHOICE/ IYOLD,IT,IP,KNTR,PROB(36),IGT,IFLG
01110C
01120C      COMMON LAYOUT
01130C      CHOICE--
01140C      IYOLD = RESET POINTER FOR SUBROUTINE USERS
01150C      IT = TYPE OF GRAPH G=GRAPHS,B=BAR CHARTS,S=SHADED BARS
01160C      IP = PROBABILITIES FLAG Y=YES,N=NO
01170C      KNTR = COUNTER FLAG FOR PROBABILITIES
01180C      PROB = ARRAY CONTAINING PROBABILITIES
01190C      IGT = MULTI-GRAPH FLAG Y=YES,N=NO
01200C      IFLG = FLAG COUNTS # OF SINGLE AXIS PLOTS TO SIX
01210C
01220C
01230      CHARACTER*1 CXXX,REPLY,RESP
01240      CHARACTER*3 CI,CR
01250      CHARACTER ADI,ADR
01260      LOGICAL DUAL
01270      REAL ATOTAL,ZTOTAL,ACOO,ZCOOP,ACONFL,ZCONFL,TF,ZST,HR,ZSH
01280      REAL PTOTAL,PCOOP,PCONFL
01290C
01300      DATA RESP/'Y'/
01310C
01320C
01330      50 CONTINUE
01340          CALL BLANC
01350          WRITE(6,1001)
01360      1001 FORMAT(3X,15(3H*), ' CRISIS EARLY WARNING PROTOTYPE SYSTEM
01370+      15(3H*),/,/)
01380          CALL CREDITS
01390          READ 6001,I
01400C
01410          ISPEED = 120
01420      53 CALL OVERLAY('OURLAY',1,0,0)
01430          CALL OVERLAY('OURLAY',2,0,0)
01440      52 CALL BLANC
01450          LSEL=0

```

```

01460      ISEL=0
01470      WRITE(6,1002)
01480 1002 FORMAT(22X,3(3H*), ' USER COMMANDS ',3(3H*),,,,
01490+      25X, ' CASE COMMANDS: ',,,,
01500+      22X, ' I = PLOT INSTRUCTIONS ',,,
01510+      22X, ' G = GRAPHICAL OUTPUT ',,,
01520+      22X, ' T = TABULAR OUTPUT ',,,
01530+      22X, ' F = FLOW SELECTION ',,,
01540+      22X, ' A = ACTOR SELECTION ',,)
01550      WRITE(6,1003)
01560 1003 FORMAT(//,25X, ' OTHER COMMANDS: ',,,,
01570+      22X, ' C = CRISIS CASES ',,,
01580+      22X, ' E = END EXECUTION ',,,,
01590+      //,22X, ' SPECIFY USER COMMAND: ',,↑)
01600      55 READ 6001,IREPLY
01610 6001 FORMAT(A1)
01620      IF(IREPLY.EQ.1HG) GOTO 56
01630      IF(IREPLY.EQ.1HI) GOTO 58
01640      IF(IREPLY.EQ.1HT) GOTO 57
01650      IF(IREPLY.EQ.1HE) GOTO 500
01660      IF(IREPLY.EQ.1HC) GOTO 53
01670      IF(IREPLY.EQ.1HA) GOTO 54
01680      IF(IREPLY.EQ.1HF) GOTO 59
01690 1005 FORMAT(//,2X, ' INCORRECT COMMAND, PLEASE ',
01700+      ' RE-ENTER (I,G,T,C,A,F OR E) ',,↑)
01710      GOTO 55
01720      59 LSEL=2
01730      CALL OVERLAY('OURLAY',1,0,0)
01740      CALL OVERLAY('OURLAY',2,0,0)
01750      GOTO 52
01760      56 CALL OVERLAY('OURLAY',4,0,0)
01770      GOTO 52
01780      57 CALL OVERLAY('OURLAY',5,0,0)
01790      GOTO 52
01800      54 LSEL=1
01810      CALL OVERLAY('OURLAY',1,0,0)
01820      CALL OVERLAY('OURLAY',2,0,0)
01830      GOTO 52
01840      58 CALL INSTRNS
01850      GOTO 52
01860      500 CONTINUE
01870      WRITE(6,5003)
01880 5003 FORMAT(2X,*EXECUTION TERMINATED.*////////)
01890      END
01900C
01910C
01920C
01930      SUBROUTINE BLANC
01940C      OBJECTIVE: THIS ROUTINE WILL CLEAR THE PAGE ON ANY
01950C                  TEKTRONIX TERMINAL. THIS IS DONE USING TWO CALLS
01960C                  TO THE PLOT-10 SOFTWARE...
01970C
01980      CALL INITT(ISPEED)
01990      CALL FINITT(0,780)
02000      PRINT,/,
02010      RETURN
02020      END
02030C
02040C
02050C
02060      SUBROUTINE CREDITS
02065C
02070C      OBJECTIVE: TO INTRODUCE TO THE USER THE GENERAL INTENTION
02080C                  OF THE PROGRAM...ETC...
02085C
02090 100 FORMAT(13X,*THE CRISIS EARLY WARNING PROTOTYPE SYSTEM WAS *,
02100+ *DEVELOPED*,/,8X,*FOR THE ADVANCED RESEARCH PROJECTS AGENCY'S *,
02110+ *CYBERNETICS*,/,8X,*TECHNOLOGY OFFICE BY DECISIONS AND DESIGNS,

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02120+ *INCORPORATED. *)
02130      WRITE(6,100)
02140 101 FORMAT(/,13X,*THE SYSTEM IS DESIGNED TO SIMULATE HOW *,
02150+ *QUANTITATIVE*,/,8X,*POLITICAL INDICATORS MIGHT HAVE CONTRIBUTED
02160+ *TO THE U.S.*,/,8X,*DEFENSE COMMUNITY'S ABILITY TO FORECAST *,
02170+ *A NUMBER OF IMPORTANT *,/,8X,*INTERNATIONAL CRISES. IT IS *,
02180+ *ALSO DESIGNED TO ILLUSTRATE*,/,8X,*HOW THE GENERAL NATURE AND *,
02190+ *DIRECTION OF INTERNATIONAL AFFAIRS*,/,8X,*MAY BE MONITORED *,
02200+ *USING POLITICAL INDICATORS. *,/,/,/,/,/)
02210      WRITE(6,101)
02220      RETURN
02230      END
02240C
02250C
02260C
02270      SUBROUTINE INSTRNS
02280C
02290C      OBJECTIVE : WHEN THE I OPTION IS CHOSEN THE USER GETS THIS
02300C      INFORMATION DISPLAYED...IT BRIEFLY DESCRIBES THE
02310C      OPERATION OF THE GRAPHICS OVERLAY....
02315C
02320 100 FORMAT(6X,*UPON INITIAL ENTRY INTO THE GRAPHICS SECTION, THE *)
02330+ *POLITICAL*,/,6X,*INDICATOR MATRIX WILL BE DISPLAYED. THIS *,
02340+ *MATRIX DESCRIBES *,/,6X,*EACH PLOT AVAILABLE TO THE USER AND *,
02350+ *IS NUMBERED ONE THROUGH *,/,6X,*TEN (TEN POSSIBLE PLOTS).*,/)
02360 200 FORMAT(6X,*IT IS THE USERS DECISION WHICH PLOTS ARE TO BE *,
02370+ *DISPLAYED, *,/,6X,*HOW MANY, WHAT PLOT TYPE (BAR OR GRAPH), AND
02380+ *THE DESIRED*,/,6X,*POSITION ON THE CRT. THE FOLLOWING ARE VALID
02390+ *RESPONSES TO*,/,6X,*QUERIES WHICH IMMEDIATELY FOLLOW THE *,
02400+ *INDICATOR MATRIX: *,/)
02410 300 FORMAT(11X,*1) DO YOU WANT MORE THAN ONE PLOT PER GRAPH (Y OR
02420 400 FORMAT(6X,*--THE 'Y' (YES) ANSWER WILL PROVIDE THE USER WITH *)
02430+ *CHOICES*,/,8X,*AVAILABLE FOR MORE THAN ONE GRAPH PLOTTED ON A *,
02440+ *SINGLE*,/,8X,*PAIR OF AXIS.*/,)
02450 500 FORMAT(6X,*--THE 'N' (NO) ANSWER WILL LEAD THE USER THROUGH *,
02460+ *A GROUP OF*,/,8X,*QUESTIONS THAT WILL ALLOW HIM TO GENERATE FROM
02470+ *ONE TO SIX*,/,8X,*SIMULTANEOUS PLOTS, EACH HAVING ITS OWN AXIS.
02480 600 FORMAT(6X,*AFTER ANY GRAPH IS DISPLAYED THE SYSTEM AWAITS THE
02490+ *INPUT OF*,/,6X,*A 'RETURN' TO CONTINUE.*/,/)
02500 605 FORMAT(31X,*- OR - *,/,/)
02510 700 FORMAT(6X,*THE USER MAY SPECIFY ANY OF THE FOLLOWING PLOT *,
02520+ *NAMES OR*,/,6X,*NUMBERS TO CREATE A BLOW-UP OF AN INDIVIDUAL *,
02530+ *GRAPH. *,/)
02540 800 FORMAT(10X,*1      OR      TOT      6      OR      CONZ*,/,
02550+ 10X,*2      OR      TOTZ      7      OR      TEN*,/,
02560+ 10X,*3      OR      COO      8      OR      TENZ*,/,
02570+ 10X,*4      OR      COOZ      9      OR      UNC*,/,
02580+ 10X,*5      OR      CON      10     OR      UNCZ*,/)
02590 810 FORMAT(11X,*2) ANOTHER DISPLAY (Y OR N) *,/)
02600 820 FORMAT(6X,*--THE 'Y' (YES) ANSWER WILL CAUSE THE INDICATOR *,
02610+ *MATRIX TO BE*,/,8X,*RE-DRAWN. *,/,/,
02620+ 6X,*--THE 'N' (NO) ANSWER WILL TERMINATE THIS OVERLAY AND *,/,
02630+ 8X,*RE-INITIATE THE 'SPECIFY USER COMMAND' SECTION.*/,/,/)
02640 10 FORMAT(20X,3(3H*),/ PLOTTER INSTRUCTIONS ',3(3H*),/,/)
02650 830 FORMAT(/,/,/,/)
02660 840 FORMAT(/,/,/)
02665C
02670      CALL BLANC
02680      WRITE(6,10)
02690      WRITE(6,100)
02700      WRITE(6,200)
02710      WRITE(6,300)
02720      WRITE(6,400)
02730      WRITE(6,500)
02740      WRITE(6,830)
02750      READ(5,6001)I
02760 6001 FORMAT(A1)
02770      CALL BLANC

```



```

02780 WRITE(6,840)
02790 WRITE(6,600)
02800 WRITE(6,605)
02810 WRITE(6,700)
02820 WRITE(6,800)
02830 WRITE(6,810)
02840 WRITE(6,820)
02850 WRITE(6,840)
02860 READ(5,6001)I
02870 RETURN
02880 END

```

```

02890C
02900C
02910C
02920

```

OVERLAY(OURLAY,1,0)

```

02930C
02940C
02950C
02960C
02970C
02980C
02990C
03000C
03010C
03020C
03030C
03040
03050C
03060C
03070C
03080C
03090C
03100C
03110C
03120C
03130C
03140
03150C
03160
03170+
03180
03190C
03200C
03210C
03220C
03230C
03240C
03250C
03260C
03270C
03280C
03290C
03300C
03310C
03320C
03330C
03340C
03350C
03360C
03370C
03380
03390
03400
03410
03420
03430C
03440
03450

```

OBJECTIVE:

TO EXECUTE THE SELECTION OF PARAMETERS. THIS OVERLAY DOES:

- 1) PRINTS CASES AND READS SELECTIONS
- 2) PRINTS SELECTED CASE HEADINGS AND ASKS FOR COUNTRY PAIR
- 3) ASKS FOR FLOW DIRECTION
- 4) ASKS FOR TIME INCREMENT
- 5) ASKS FOR START DATE (SDATE) AND FINISH DATE (FDATE)
- 6) READS DATE INDEX FILE + CHECKS FOR VALID DATE
- 7) READS NATION FILE + CHECKS FOR VALID ID'S

PROGRAM DIALOG

SUBROUTINES--

- 1) MCODE - RETRIEVES NUMERIC ID AND ALPHA DESCRIPTOR OF ACTORS
- 2) CASE - PRINTS OUT CASE MENU AND SELECTION
- 3) SETUP - ASKS FOR COUNTRY PAIRS, FLOW DIRECTION + TIME INCRE
- 4) TSETUP - ASKS FOR SDATE AND FDATE
- 5) SSBC,CZEINU,INDWAR,USSOU,USPEO,SOUPEO - ALL PRINT CASE HEAD

IMPLICIT INTEGER(A-Z)

```

COMMON /PARAM/ CI,NI,ADI(3),CR,NR,ADR(3),DUAL,
SDATE,FDATE,TCODE,SMODE,R,ISPEED,INITAB
COMMON/POINT/BP,LSEL,ISEL

```

MAJOR PARAMETERS:

```

LSEL - SET IN MAIN 0.0
      1 = IF ACTOR SELECTION
      2 = FLOW ONLY SELECTION
ISEL - 1,2,3,4,5 OR 6 CASE SELECTION
DUAL - TRUE = 2-WAY FLOW
      FALSE = 1 WAY FLOW
INAT,NI,CI = INITIATOR
JNAT,NR,CR = RECIPIENT
FLOW - 0 = <<<<<< REVERSE DIRECTION
      1 = >>>>>> OK AS IS
      2 = TWO WAY FLOW
SDATE = START(BEGINNING) DATE
FDATE = END (FINAL) DATE
SMODE = ALWAYS SET TO (2) PROGRESSIVE Z-SCORES
TCODE,MAY = TIME INCREMENT SELECTED
R - RECORD NUMBER OF SDATE IN DATA BASE

```

```

CHARACTER*3 CI,CR,ALL,INAT,JNAT
CHARACTER*1 CXXX,REPLY,RESP
CHARACTER ADI,ADR
CHARACTER*10 ANY(3)
LOGICAL DUAL

```

```

DATA RESP/'Y'/
DATA ANY/'ANY COUNTR','Y',' '

```

```

03460      DATA ALL/'ALL'/
03470      CALL BLANC
03480      IF(LSEL.EQ.2) GOTO 205
03490      IF(LSEL.NE.1) GOTO 201
03500      WRITE(6,2001)
03510 2001 FORMAT(/,/,2X,'PLEASE SELECT ONE CASE NUMBER :',↑)
03520      203 READ(5,*)ISEL
03530      IF(ISEL.GE.1.A.ISEL.LE.6) GOTO 202
03540      WRITE(6,2002)
03550 2002 FORMAT(2X,'*INCORRECT CASE NUMBER, PLEASE RE-ENTER *,↑)
03560      GOTO 203
03570      201 CONTINUE
03580      CALL CASE(ISEL)
03590      202 CALL BLANC
03600      GOTO(301,302,303,304,305,309),ISEL
03610      301 CALL SSBC
03620      GOTO 306
03630      302 CALL CZEINU
03640      GOTO 306
03650      303 CALL INDWAR
03660      GOTO 306
03670      304 CALL USSOV
03680      GOTO 306
03690      305 CALL USPED
03700      GOTO 306
03710      309 CALL SOUPEO
03720      306 CONTINUE
03730      308 CONTINUE
03740      CALL SETUP(ISEL,INAT,JNAT,FLOW,MQY)
03750      DUAL=.FALSE.
03760      IF(FLOW.EQ.2)DUAL=.TRUE.
03770      CALL TSETUP(SDATE,FDATE)
03780      GOTO 204
03790 205 CALL SETUP(ISEL,INAT,JNAT,FLOW,MQY)
03800      DUAL=.FALSE.
03810      IF(FLOW.EQ.2)DUAL=.TRUE.
03820      204 IF(MQY.NE.1) GOTO 307
03830      WRITE(6,3001)
03840 3001 FORMAT(/,2X,'DO YOU DESIRE 30 DAY PROBABLISTIC *,
03850+ *FORCASTS (Y OR N) : ',↑)
03860      READ(5,3003)IREPLY
03870      307 INITAB=0
03880      IF(IREPLY.EQ.1HY) INITAB=1
03890      100 CONTINUE
03900      WRITE(6,3004)
03910 3004 FORMAT(20X,' . . . P R O C E S S I N G . . . ',)
03920 3003 FORMAT(A1)
03930      CI=INAT
03940C
03950      IF(CI.NE.ALL) GO TO 105
03960      NI=0
03970      DO 104 I=1,3
03980      ADI(I)=ANY(I)
03990      104 CONTINUE
04000      GO TO 110
04010      105 CONTINUE
04020C
04030      CALL NCODE(CI,NI,ADI)
04040C
04050      IF(NI.NE.0) GO TO 110
04060      WRITE(6,9001)INAT
04070 9001 FORMAT(' *** ILLEGAL ACTOR - ',A3,' *** ',/)
04080      GOTO 308
04090      110 CONTINUE
04100C
04110 1003 FORMAT(' INITIATOR IS ',3A10/)
04120C
04130      120 CONTINUE

```

```

04140      CR=JNAT
04150C
04160      IF<CR.NE.ALL> GO TO 125
04170      NR=0
04180      DO 124 I=1,3
04190      ADR(I)=ANY(I)
04200      124 CONTINUE
04210      GO TO 130
04220      125 CONTINUE
04230C
04240      CALL NCODE<CR,NR,ADR>
04250C
04260      IF<NR.NE.0> GO TO 130
04270      WRITE<6,9001>JNAT
04280      GOTO 300
04290      130 CONTINUE
04300C
04310      1005 FORMAT<' RECIPIENT IS ',3A10/>
04320C
04330      1006 FORMAT<' CAN ROLES BE REVERSED',↑>
04340C
04350      160 CONTINUE
04360C
04370      CALL PFUR<3HRET,1,6HRWINDX,0>
04380      REWIND 1
04390C
04400      YM=SDATE/100
04410C
04420      165 CONTINUE
04430      READ<1,3002,END=166> YYMM,R
04440      3002 FORMAT<I4,I6>
04450      IF<YYMM.NE.YM> GO TO 165
04460      GO TO 167
04470C
04480      166 CONTINUE
04490      WRITE<6,9005>
04500      9005 FORMAT<' *** START DATE DOES NOT APPEAR IN WEIS DATA.'/>
04510      GO TO 160
04520C
04530      167 CONTINUE
04540C
04550      170 CONTINUE
04560      TCODE=MOY
04570      IF<TCODE.GE.1.AND.TCODE.LE.3> GO TO 180
04580C
04590      180 CONTINUE
04600C
04610      IF<FDATE.GE.SDATE> GO TO 190
04620      190 CONTINUE
04630C
04640      191 CONTINUE
04650      1010 FORMAT<' SELECT MODE FOR COMPUTING Z-SCORES ',
04660+      <' (1=NORMAL,2=PROGRESSIVE): ',↑>
04670      2004 FORMAT<I1>
04680      SMODE = 2
04690C
04700      9004 FORMAT<' *** ILLEGAL MODE--TRY AGAIN.'/>
04710C
04720      END
04730C
04740C
04750C
04760      SUBROUTINE NCODE<ACODE,NID,DESCR>
04770C
04780C      OBJECTIVE: TO DETERMINE THE NUMERIC ID AND THE DESCRIPTOR
04790C      <FULL NAME> FOR THE COUNTRY SPECIFIED BY A GIVEN ALPHABETIC
04800C      CODE.
04810C

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04820C ACODE - THREE CHAR ALPHABETIC CODE.
04830C MID - THREE DIGIT NUMERIC ID (SET BY NCODE). SET TO 0
04840C IF ACODE IS NOT A VALID CODE.
04850C DESCR - THIRTY CHAR DESCRIPTOR (SET BY NCODE).
04860C
04870C COUNTRY ID DATA (NATION) ARE ASSUMED FORMATTED IN
04880C RECORDS OF 38 CHARS EACH:
04890C NNN AAA DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD
04900C <----- 38 ----->
04910C WHERE
04920C NNN - NUMERIC ID
04930C AAA - ALPHABETIC CODE
04940C DD...D - DESCRIPTOR (FULL COUNTRY NAME)
04950C
04960 IMPLICIT INTEGER(A-Z)
04970C
04980 CHARACTER*1 S1,S2
04990 CHARACTER*3 AAA,ACODE
05000 INTEGER DDD(3),DESCR(3)
05010C
05020C
05030 CALL PFUR(3HRET,1,6HNATION,0)
05040C
05050 MID=0
05060C
05070 100 CONTINUE
05080 READ(1,1001,END=200) NNN,S1,AAA,S2,(DDD(I),I=1,3)
05090 1001 FORMAT(I3,A1,A3,A1,3A10)
05100 IF(AAA.EQ.ACODE) GO TO 150
05110 GO TO 100
05120C
05130 150 CONTINUE
05140 MID=NNN
05150 DO 160 I=1,3
05160 DESCR(I)=DDD(I)
05170 160 CONTINUE
05180C
05190 200 CONTINUE
05200 RETURN
05210 END
05220C
05230C
05240C
05250 SUBROUTINE CASE(ISEL)
05260C
05270C OBJECTIVE:
05280C TO DISPLAY 6 CASE MENU AND RETURN 'ISEL' VARIABLE. 'ISEL'
05290C SHOULD BE AN INTEGER FROM 1 TO 6 DENOTING THE CASE NUMBER
05300C SELECTED...
05310C
05320 WRITE(6,1001)
05330 1001 FORMAT(4X,*THE FOLLOWING INTERNATIONAL CRISIS *,
05340+ *CASES ARE NOW AVAILABLE *,/,4X,*ON THE DEMONSTRATION *,
05350+ *SYSTEM : *,/)
05360 WRITE(6,1002)
05370 1002 FORMAT(6X,*1.*,2X,*SINO - SOVIET BORDER CLASHES,*,
05380+ /,10X,*JANUARY , 1967 AND MARCH , 1969 *,/)
05390 WRITE(6,1003)
05400 1003 FORMAT(6X,*2.*,2X,*CZECHOSLOVAKIAN INVASION, *,
05410+ /,10X,*AUGUST , 1968 *,/)
05420 WRITE(6,1004)
05430 1004 FORMAT(6X,*3.*,2X,*INDO - PAKISTANI WAR, *,
05440+ /,10X,*NOVEMBER , 1971 *,/)
05450 WRITE(6,1005)
05460 1005 FORMAT(4X,*THE SYSTEM ALSO CONTAINS THE FOLLOWING OTHER CASE
05470+ WRITE(6,1006)
05480 1006 FORMAT(6X,*4.*,2X,*U.S. - SOVIET UNION, *,
05490+ /,10X,*JANUARY , 1966 - DECEMBER , 1975 *,/)

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05500      WRITE(6,1007)
05510 1007 FORMAT(6X,*,2X,*U.S. - PEOPLES REPUBLIC OF CHINA, *,
05520+      /,10X,*JANUARY , 1966 - DECEMBER , 1975 *,/)
05530      WRITE(6,1010)
05540 1010 FORMAT(6X,*,2X,*SOVIET UNION - PEOPLES REPUBLIC OF CHINA,
05550+      /,10X,*JANUARY , 1966 - DECEMBER , 1975 *,/)
05560      10 WRITE(6,1008)
05570 1008 FORMAT(/,4X,*PLEASE SELECT ONE CASE NUMBER :*,†)
05580      READ(5,*)ISEL
05590      IF(ISEL.GE.1.A.ISEL.LE.6) GOTO 20
05600      WRITE(6,1009)
05610 1009 FORMAT(2X,*INCORRECT CASE NUMBER, PLEASE RE-ENTER *)
05620      GOTO 10
05630      20 CONTINUE
05640      RETURN
05650      END
05660C
05670C
05680C
05690      SUBROUTINE SETUP(SEL,IN,JN,FL,MQ)
05700C      OBJECTIVE:
05710C      TO GATHER THE FOLLOWING INPUT FROM THE USER:
05720C      IN = INITIATOR IN FORM 'XXX'
05730C      JN = RECIPIENT IN FORM 'YYY'
05740C      FL = ACTIVITY FLOW
05750C      0 = >>>
05760C      1 = <<<
05770C      2 = <->
05780C      MQ = TIME INCREMENT
05790C      1 = MONTHLY
05800C      2 = QUARTERLY
05810C      3 = YEARLY
05820C      (NOTE) CODE FOR DAILY AND 1/2 YRLY STILL INTACT
05830C
05840      IMPLICIT INTEGER (A-Z)
05850      COMMON /PARAM/ CI,MI,ADI(3),CR,MR,ADR(3),DUAL,
05860+      SDATE,FDATE,TCODE,SMODE,R,ISPEED,INITAB
05870      COMMON /POINT/ BP,LSEL,ISEL
05880      CHARACTER*3 IN,JN,TM
05890      CHARACTER*3 CI,CR
05900      IF(LSEL.EQ.2) GOTO 15
05910      IF(SEL.EQ.4.O.SEL.EQ.5.O.SEL.EQ.6) GOTO 10
05920      WRITE(6,1001)
05930 1001 FORMAT(2X,*PLEASE SELECT TWO ACTORS : (E.G. XXX,YYY) *,†)
05940      READ(5,2001)IN,JN
05950 2001 FORMAT(A3,1X,A3)
05960      10 CONTINUE
05970      GOTO(13,13,13,11,12,14),SEL
05980      14 IN='USR'
05990      JN='CHN'
06000      GOTO 13
06010      11 IN='USA'
06020      JN='USR'
06030      GOTO 13
06040      12 IN='USA'
06050      JN='CHN'
06060      13 CONTINUE
06070      GOTO 16
06080      15 IN=CI
06090      JN=CR
06100      16 CONTINUE
06110      WRITE(6,1002)IN,JN,IN,JN,IN,JN
06120 1002 FORMAT(/,2X,*SPECIFY ACTIVITY FLOW : *,/,
06130+      6X,*0. ONE WAY (*,A3,* >>> *,A3,*)*,/,
06140+      6X,*1. ONE WAY (*,A3,* <<< *,A3,*)*,/,
06150+      6X,*2. TWO WAY (*,A3,* <-> *,A3,*)*,†)
06160      20 CONTINUE
06170      READ(5,*)FL

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06180 2002 FORMAT(I1)
06190 IF(FL.GE.0.A.FL.LE.2) GOTO 30
06200 WRITE(6,1003)
06210 1003 FORMAT(2X,*INCORRECT FLOW NUMBER, PLEASE RE-ENTER *)
06220 GOTO 20
06230 30 IF(FL.NE.1) GOTO 31
06240 TN=IN
06250 IN=JN
06260 JN=TN
06270 31 CONTINUE
06280 IF(LSEL.NE.2) GOTO 32
06290 MQ=TCODE
06300 RETURN
06310 32 WRITE(6,1004)
06320 1004 FORMAT(/,2X,*SELECT TIME INCREMENT :*,/,
06330+ 6X,*1. MONTHLY *,/,6X,*2. QUARTERLY *,/,6X,*3. YEARLY*,6X,†)
06340 READ(5,*)MQ
06350 IF(MQ.GE.1.A.MQ.LE.3) GOTO 40
06360 WRITE(6,1005)
06370 1005 FORMAT(2X,*INCORRECT TIME INCREMENT, PLEASE RE-ENTER*)
06380 GOTO 30
06390 40 CONTINUE
06400 RETURN
06410 END
06420C
06430C
06440C
06450 SUBROUTINE TSETUP(IDATE,JDATE)
06460C OBJECTIVE:
06470C TO READ IN PARAMETERS FM,FY,SM,SY, WHICH ARE THE 'FIRST MONTH'
06480C 'FIRST YEAR', 'SECOND MONTH', 'SECOND YEAR', RESPECTIVELY.
06490C TO CHECK THESE MONTHS/YEARS FOR VALIDITY AND CONVERT THEM FROM
06500C 3-DIGIT ALPHA TWO DIGIT NUMERIC TO SIX DIGIT NUMERIC. I.E.
06510C JUN 77 - MAY 78 TO 770601 - 780531
06520C
06530C MAJOR PARAMETERS
06540C IDATE - 'SDATE' RETURNED IN FORM YYMMDD
06550C JDATE - 'FDATE' RETURNED IN FORM YYMMDD
06560C
06570 INTEGER FM,FY,FD,SM,SY,SD,FMC,SMC
06580 DIMENSION MONTHS(12)
06590 DATA MONTHS /3HJAN,3HFEB,3HMAR,3HAPR,
06600+ 3HMAY,3HJUN,3HJUL,3HAUG,
06610+ 3HSEP,3HOCT,3HNOV,3HDEC/
06620 FD=01
06630 SD=31
06640 10 WRITE(6,1001)
06650 1001 FORMAT(/,2X,*SET TIME PARAMETERS (JAN66,DEC75) :*,†)
06660 READ(5,2001)FM,FY,SM,SY
06670 2001 FORMAT(A3,I2,1X,A3,I2)
06680 FMC=0
06690 DO 20 I=1,12
06700 IF(FM.EQ.MONTHS(I))FMC=I
06710 20 CONTINUE
06720 IF(FMC.NE.0) GOTO 30
06730 WRITE(6,1002)
06740 1002 FORMAT(2X,*FIRST MONTH INCORRECT, PLEASE RE-ENTER *)
06750 GOTO 10
06760 30 SMC=0
06770 DO 40 I=1,12
06780 IF(SM.EQ.MONTHS(I))SMC=I
06790 40 CONTINUE
06800 IF(SMC.NE.0) GOTO 50
06810 WRITE(6,1003)
06820 1003 FORMAT(2X,*SECOND MONTH INCORRECT, PLEASE RE-ENTER*)
06830 GOTO 10
06840 50 CONTINUE
06850 IF(FY.GE.66.A.FY.LE.75) GOTO 60

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06860      WRITE(6,1004)
06870 1004  FORMAT(2X,$YEAR PARAMETER NOT WITHIN DATA BASE $,
06880+      $, PLEASE RE-ENTER $)
06890      GOTO 10
06900      60  CONTINUE
06910          IF(SY.GE.66.A.SY.LE.75) GOTO 70
06920      WRITE(6,1004)
06930      GOTO 10
06940      70  CONTINUE
06950          IDATE=(((FY*10000)+(FMC*100))+FD)
06960          JDATE=(((SY*10000)+(SMC*100))+SD)
06970      RETURN
06980      END
06990C
07000C
07010C
07020      SUBROUTINE SSBC
07030C
07040C      OBJECTIVE - PROVIDE HEADING IF ISEL = 1
07050C
07060      WRITE(6,1001)
07070 1001  FORMAT(2X,3(3H*),$ SINO - SOVIET BORDER CLASHES , $,
07080+      $JAN , 1967 AND MARCH , 1969 $,3(3H*),/)
07090      WRITE(6,1002)
07100 1002  FORMAT(6X,$PRIMARY ACTORS : $,/,
07110+      10X,$PEOPLES REPUBLIC OF CHINA (CHN) $,/,
07120+      10X,$SOVIET UNION (USR) $,/,
07130+      6X,$OTHER ACTORS : $,/,
07140+      10X,$UNITED STATES (USA) $,/)
07150      RETURN
07160      END
07170C
07180C
07190C
07200      SUBROUTINE CZEINU
07210C
07220C      OBJECTIVE - PROVIDE HEADING IF ISEL = 2
07230C
07240      WRITE(6,1001)
07250 1001  FORMAT(2X,3(3H*),$ CZECHOSLOVAKIAN INVASION , $,
07260+      $AUGUST , 1968 $,3(3H*),/)
07270      WRITE(6,1002)
07280 1002  FORMAT(6X,$PRIMARY ACTORS : $,/,
07290+      10X,$SOVIET UNION (USR) $,/,
07300+      10X,$CZECHOSLOVAKIA (CZE) $,/,
07310+      6X,$OTHER ACTORS : $,/,
07320+      10X,$UNITED STATES (USA)$,/,
07330+      10X,$PEOPLES REPUBLIC OF CHINA (CHN) $,/)
07340      RETURN
07350      END
07360C
07370C
07380C
07390      SUBROUTINE INDWAR
07400C
07410C      OBJECTIVE - PROVIDE HEADING IF ISEL = 3
07415C
07420      WRITE(6,1001)
07430 1001  FORMAT(2X,3(3H*),$ INDO - PAKISTAN WAR , $,
07440+      $NOVEMBER , 1971 $,3(3H*),/)
07450      WRITE(6,1002)
07460 1002  FORMAT(6X,$PRIMARY ACTORS : $,/,
07470+      10X,$INDIA (IND)$,/,
07480+      10X,$PAKISTAN (PAK)$,/,
07490+      6X,$OTHER ACTORS : $,/,
07500+      10X,$UNITED STATES (USA)$,/,
07510+      10X,$SOVIET UNION (USR)$,/,
07520+      10X,$PEOPLES REPUBLIC OF CHINA (CHN)$,/,

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07530+      10X,*BANGLADESH (BGD)*,/)
07540      RETURN
07550      END
07560C
07570C
07580C
07590      SUBROUTINE USSOU
07600C
07610C      OBJECTIVE - PROVIDE HEADING IF ISEL = 4
07620C
07630      WRITE(6,1001)
07640      1001 FORMAT(2X,3(3H*),* U.S. - SOVIET UNION ,*,
07650+      *JAN , 1966 - DEC , 1975 *,3(3H*),/)
07660      WRITE(6,1002)
07670      1002 FORMAT(6X,*ACTORS : USA , USR *,/)
07680      RETURN
07690      END
07700C
07710C
07720C
07730      SUBROUTINE USPEO
07740C
07750C      OBJECTIVE - PROVIDE HEADING IF ISEL = 5
07760C
07770      WRITE(6,1001)
07780      1001 FORMAT(2X,3(3H*),* U.S. - PEOPLES REPUBLIC OF CHINA , *,
07790+      *JAN , 1966 - DEC , 1975 *,3(3H*),/)
07800      WRITE(6,1002)
07810      1002 FORMAT(6X,*ACTORS : USA , CHN *,/)
07820      RETURN
07830      END
07840C
07850C
07860C
07870      SUBROUTINE SOUPEO
07880C
07890C      OBJECTIVE - PROVIDE HEADING IF ISEL = 6
07900C
07910      WRITE(6,1001)
07920      1001 FORMAT(,3(3H*),* SOVIET UNION - PEOPLES REPUBLIC OF CHINA
07930+      *JAN , 1966 - DEC , 1975 *,3(3H*),/)
07940      WRITE(6,1002)
07950      1002 FORMAT(6X,*ACTORS : USR , CHN *,/)
07960      RETURN
07970      END
07980C
07990C
08000C
08010C
08020      OVERLAY(OURLAY,2,0)
08030C
08040C      OBJECTIVE:
08050C      .TO READ THE DATA BASE AND EXTRACT ALL QUALIFIED DATA AND PLAC
08060C      INTO NEVENT ARRAY.
08070C      .TO DETERMINE NO. OF QUALIFIED EVENTS WITHIN TIME PERIOD, IN
08080C      INCREMENT AND TO COUNT THEM.
08090C      . TO CREATE ARRAYS AS FOLLOWS:
08100C      COOP - COOPERATIVE EVENTS
08110C      CONFL - CONFLICTUAL EVENTS
08120C      TOTAL - TOTAL COOPERATIVE + CONFLICTIVE
08130C      TF - TENSION LEVELS
08140C      HR - H-RELS
08150C      .TO CREATE A Z-SCORE ARRAY FOR EACH
08160C      .TO CREATE A PROBABILITY ARRAY FOR EACH
08170C      .TO PRODUCE A 30-DAY PROBABILITY TABLE IF REQUESTED IN ONLY 1
08180C      .TO PRODUCE RDATE ARRAY OF READABLE DATES IN FORM MMM YY
08190C
08200C

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00210C SUBROUTINES--
00220C ZSCORP - CALCULATE Z-SCORES
00230C TENSION - CALCULATE TENSION
00240C HREL - CALCULATE H-RELS
00250C CONVRT - CONVERT INTEGER TO REAL ARRAYS
00260C PTABLE - ASSIGN PROBABILITIES
00270C NXTINC - NEXT TIME INCREMENT FUNCTION
00280C SMLTAB - PRINT 30-DAY PROBABILITY TABLE
00290C DEKODE - RETURN ALPHA YEAR + MONTH
00300C DEKODA - RETURN ALPHA DATE ARRAY
00310C
00320C
00330C PROGRAM SEARCH
00340C
00350C MAJOR PARAMETERS
00360C MAX = MAXIMUM NUMBER OF PERIODS
00370C MAXREC = LAST SECTOR OF DATA BASE
00380C RUSD = FILENAME OF DATA BASE (LOGICAL UNIT 1)
00390C JR = 1ST RECORD OF DATA BASE
00400C R = RECORD CORRESPONDING TO SDATE IN DATA BASE
00410C CDATE = CURRENT DATE AS DATA BASE IS BEING READ
00420C NP = NUMBER OF POINTS AFTER CDATE = SDATE
00430C BP = POINT WHEN NP=1
00440C IC = TOTAL PERIODS COLLECTED
00450C NDATE, NEVENT, NCONFL, NCOOP, NTOTAL ARE THE INITIAL
00460C COLLECTION ARRAYS USED FOR CALCULATION OF PROGRESSIVE
00470C Z-SCORES
00480C NCOUNT, COUNT = TOTAL + ACTUAL EVENT COUNTS
00490C
00500C IMPLICIT INTEGER(A-Z)
00510C
00520C COMMON /PARAM/ CI, NI, ADI(3), CR, NR, ADR(3), DUAL,
00530C SDATE, FDATE, TCODE, SMODE, R, ISPEED, INITAB
00540C COMMON /RESLT/ COUNT, IC, DATE(36), EVENT(22, 36),
00550C COOP(36), CONFL(36), TOTAL(36), ATOTAL(36),
00560C ZTOTAL(36), ACOOP(36), ZCOOP(36), ACONFL(36),
00570C ZCONFL(36), TF(36), ZST(36), HR(36), ZSH(36),
00580C PTOTAL(36), PCOOP(36), PCONFL(36), RDATE(36)
00590C COMMON /POINT/ BP, LSEL, ISEL
00600C DIMENSION NEVENT(22, 120), NCOOP(120), NCONFL(120), NTOTAL(120)
00610C
00620C CHARACTER*3 CI, CR
00630C CHARACTER ADI, ADR
00640C LOGICAL DUAL
00650C REAL ZTOTAL, ZCOOP, ZCONFL
00660C REAL ATOTAL, ACOOP, ACONFL
00670C REAL ZST, ZSH, TF, HR
00680C REAL RTEMP(120), NTF(120), NHR(120), NDATE(120)
00690C REAL PTOTAL, PCOOP, PCONFL
00700C
00710C DATA NE/22/
00720C
00730C DATA MAX/36/
00740C DATA MAXREC/6552/
00750C
00760C CALL DFUR('GETR', 'RUSD', 'RUSD', 0, 0)
00770C
00780C CLOSE(1)
00790C OPEN(1, NAME='RUSD', READONLY=.TRUE., TYPE='OLD')
00800C
00810C COUNT=0
00820C NCOUNT=0
00830C BP=0
00840C IC=0
00850C JR=1
00860C DATE(IC)=IDATE
00870C GO TO 201
00880C

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08890 200 CONTINUE
08900 IF(JR.GE.R)R=R+1
08910 JR=JR+1
08920 IF(R.GT.MAXREC) GO TO 300
08930 201 CONTINUE
08940 READ(1,3001,REC=JR)CDATE,III,EEE,RRR,AAA
08950 3001 FORMAT(I6,4I3)
08960C
08970 IF(JR.LT.R)GOTO 202
08980 IF(CDATE.LT.SDATE) GO TO 200
08990 IF(CDATE.GT.FDATE) GO TO 300
09000C
09010 202 CONTINUE
09020 IF(.NOT.NXTINC(TCODE,IDATE,CDATE)) GO TO 210
09030 IF(IC.LT.MAX) GO TO 203
09040 GOTO 203
09050 WRITE(6,1012) MAX
09060 1012 FORMAT(' MAX NO OF INTERVALS (',I3,') EXCEEDED--',
09070+ 'TABULATION INTERRUPTED.')
09080 GO TO 300
09090 203 CONTINUE
09100 IC=IC+1
09110 IF(CDATE.GE.SDATE)NP=NP+1
09120 IF(NP.EQ.1)BP=IC
09130 NDATE(IC)=IDATE
09140 DO 205 E=1,22
09150 NEVENT(E,IC)=0
09160 205 CONTINUE
09170 210 CONTINUE
09180C
09190 IF((NI.EQ.0.OR.III.EQ.NI).AND.(NR.EQ.0.OR.RRR.EQ.NR))
09200+ GO TO 220
09210 IF(DUAL.AND.
09220+ (NR.EQ.0.OR.III.EQ.NR).AND.(NI.EQ.0.OR.RRR.EQ.NI))
09230+ GO TO 220
09240 GO TO 200
09250C
09260 220 CONTINUE
09270 COUNT=COUNT+1
09280 IF(CDATE.GE.SDATE)NCOUNT=NCOUNT+1
09290 E=EEE/10
09300 NEVENT(E,IC)=NEVENT(E,IC)+1
09310 GO TO 200
09320C
09330 300 CONTINUE
09340 CLOSE(1,DISP='KEEP')
09350 WRITE(6,1011)NCOUNT
09360 1011 FORMAT(/,2X,'NUMBER OF EVENTS FOUND : ',I5,/)
09370 READ 100,I
09380 100 FORMAT(A1)
09390 IF(COUNT.EQ.0) GO TO 320
09400C
09410 DO 310 I=1,IC
09420 NCOOP(I)=0
09430 DO 305 E=1,10
09440 NCOOP(I)=NCOOP(I)+NEVENT(E,I)
09450 305 CONTINUE
09460 NCONFL(I)=0
09470 DO 306 E=11,22
09480 NCONFL(I)=NCONFL(I)+NEVENT(E,I)
09490 306 CONTINUE
09500 NTOTAL(I)=NCOOP(I)+NCONFL(I)
09510 310 CONTINUE
09520C
09530 320 CONTINUE
09540C
09550C
09560C

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09570      CALL CONVRT(IC,NTOTAL,RTEMP)
09580      CALL ZSCORP(IC,RTEMP,ZTOTAL)
09590      CALL PTABLE(ZTOTAL,NP,2,PTOTAL)
09600      CALL CONVRT(IC,NCOOP,RTEMP)
09610      CALL ZSCORP(IC,RTEMP,ZCOOP)
09620      CALL PTABLE(ZCOOP,NP,4,PCOOP)
09630      CALL CONVRT(IC,NCONFL,RTEMP)
09640      CALL ZSCORP(IC,RTEMP,ZCONFL)
09650      CALL PTABLE(ZCONFL,NP,6,PCONFL)
09660C
09670      313 CONTINUE
09680C
09690      CALL TENSOR(IC,NCONFL,NTOTAL,NTF)
09700      CALL ZSCORP(IC,NTF,ZST)
09710      CALL HREL(IC,NE,NEVENT,NTOTAL,NHR)
09720      CALL ZSCORP(IC,NHR,ZSH)
09725C
09730      I=1
09740      DO 150 J=BP,IC
09750      TF(I)=NTF(J)
09760      HR(I)=NHR(J)
09770      DATE(I)=NDATE(J)
09780      I=I+1
09790      150 CONTINUE
09800      I=1
09810      DO 160 J=BP,IC
09820      COOP(I)=NCOOP(J)
09830      CONFL(I)=NCONFL(J)
09840      TOTAL(I)=NTOTAL(J)
09850      I=I+1
09860      160 CONTINUE
09870      I=1
09880      DO 170 J=BP,IC
09890      DO 180 E=1,22
09900      EVENT(E,I)=NEVENT(E,J)
09910      180 CONTINUE
09920      I=I+1
09930      170 CONTINUE
09940      IC=NP
09950      COUNT=NCOUNT
09960      IF(INITAB.EQ.1)CALL SMLTAB
09970      IF(INITAB.NE.1)CALL DEKODA(IC,DATE,RDATE)
09980      END
09990C
10000C
10010C
10020      SUBROUTINE ZSCORP(N,C,ZS)
10030C
10040C      OBJECTIVE: TO CALCULATE PROGRESSIVE MEANS AND PROGRESSIVE
10050C      Z-SCORES FOR A COLLECTION OF ITEMS. THE MEAN AND THE Z-SCORE
10060C      FOR THE ITH ITEM IS BASED UPON THE PRECEDING I-1 ITEMS ONLY.
10070C
10080C      N          - NO OF ITEMS IN COLLECTION (>=1).
10090C      C(N)       - COLLECTION OF ITEMS.
10100C      MEAN(N)    - MEANS (SET BY ZSCORP).
10110C      ZS(N)      - Z-SCORES (SET BY ZSCORP).
10120C      ZSR(120)   - TEMPORARY COLLECTION ARRAY
10130C
10140      IMPLICIT INTEGER(A-Z)
10150C
10160      COMMON/POINT/BP
10170      REAL C(N)
10180      REAL SUM,SQ,SD,DEV
10190      REAL SQRT
10200      REAL ZSR(120),ZS(36)
10210      REAL MEAN(120)
10220C
10230C

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10240      SUM=0.
10250      SQ=0.
10260      MEAN(1)=0.
10270      ZSR(1)=0.
10280C
10290      IF(N.LE.1) GO TO 200
10300C
10310      DO 140 I=2,N
10320      K=I-1
10330      SUM=SUM+C(K)
10340      SQ=SQ+C(K)*C(K)
10350      MEAN(I)=SUM/K
10360      IF(K.GT.1) GO TO 100
10370      SD=0.
10380      GO TO 110
10390      100 CONTINUE
10400      SD=SQRT((K*SQ-SUM*SUM)/(K*(K-1)))
10410      110 CONTINUE
10420      IF(SD.NE.0.) GO TO 120
10430      ZSR(I)=0.
10440      GO TO 130
10450      120 CONTINUE
10460      ZSR(I)=(C(I)-MEAN(I))/SD
10470      130 CONTINUE
10480      140 CONTINUE
10490C
10500      200 CONTINUE
10510      I=1
10520      DO 150 J=BP,N
10530      ZS(I)=ZSR(J)
10540      I=I+1
10550      150 CONTINUE
10560      RETURN
10570C
10580      END
10590      SUBROUTINE TENSION(N,CONFL,TOTAL,TF)
10600C
10610C      OBJECTIVE:  TO CALCULATE THE TENSION FACTOR (PERCENT OF
10620C      CONFLICTIVE EVENTS) FOR EACH OF A COLLECTION OF TIME
10630C      INTERVALS.
10640C
10650C      N          - NO OF TIME INTERVALS (>=1).
10660C      CONFL(N)   - NO OF CONFLICTIVE EVENTS IN EACH TIME INTERVAL.
10670C      TATAL(N)   - TOTAL NO OF EVENTS IN EACH TIME INTERVAL.
10680C      TF(N)      - TENSION FACTOR FOR EACH TIME INTERVAL (SET BY
10690C                  TENSION).
10700C
10710      IMPLICIT INTEGER(A-Z)
10720C
10730      INTEGER CONFL(N),TOTAL(N)
10740      REAL TF(N)
10750C
10760C
10770      DO 100 I=1,N
10780      TF(I)=0.
10790      IF(TOTAL(I).EQ.0.) GO TO 100
10800      TF(I)=100.*CONFL(I)/TOTAL(I)
10810      100 CONTINUE
10820C
10830      RETURN
10840C
10850      END
10852C
10853C
10854C
10860      SUBROUTINE HREL(N,NE,EVENT,TOTAL,HR)
10870C
10880C      OBJECTIVE:  TO CALCULATE H-REL OVER ALL EVENT CATEGORIES

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10890C   FOR EACH OF A COLLECTION OF TIME INTERVALS.
10900C
10910C   N           - NO OF TIME INTERVALS (>=1).
10920C   NE          - NO OF EVENT CATEGORIES.
10930C   EVENT(NE,N) - NO OF EVENTS IN EACH CATEGORY FOR EACH TIME
10940C                   INTERVAL.
10950C   TOTAL(N)    - TOTAL NO OF EVENTS IN EACH TIME INTERVAL.
10960C   HR(N)       - H-REL FOR EACH TIME INTERVAL (SET BY HREL).
10970C
10980C       IMPLICIT INTEGER(A-Z)
10990C
11000C       INTEGER EVENT(NE,N),TOTAL(N)
11010C       REAL HR(N)
11020C       REAL HMAX,HABS,R
11030C       REAL ALOG,ALOG2
11040C
11050C   NOTE: LOG2(X)=ALOG(X)/ALOG(2)
11060C
11070C
11080C       ALOG2=ALOG(2.)
11090C
11100C       HMAX=-ALOG(1./NE)/ALOG2
11110C
11120C       DO 110 I=1,N
11130C           HABS=0.
11140C           DO 100 E=1,NE
11150C               IF(EVENT(E,I).EQ.0) GO TO 100
11160C               R=1.*EVENT(E,I)/TOTAL(I)
11170C               HABS=HABS-R*ALOG(R)/ALOG2
11180C   100 CONTINUE
11190C               HR(I)=HABS/HMAX
11200C   110 CONTINUE
11210C
11220C       RETURN
11230C
11240C   END
11245C
11246C
11247C
11250C       SUBROUTINE CONVRT(N,IDATA,RDATA)
11260C
11270C   OBJECTIVE: TO CONVERT AN ARRAY OF INTEGER VALUES INTO AN
11280C   ARRAY OF REAL VALUES.
11290C
11300C   N           - NO OF ITEMS.
11310C   IDATA(N)    - INTEGER ARRAY.
11320C   RDATA(N)    - REAL ARRAY (SET BY CONVRT).
11330C
11340C       IMPLICIT INTEGER(A-Z)
11350C
11360C       INTEGER IDATA(N)
11370C       REAL RDATA(N)
11380C
11390C
11400C       DO 100 I=1,N
11410C           RDATA(I)=IDATA(I)
11420C   100 CONTINUE
11430C
11440C       RETURN
11450C
11460C   END
11470C
11480C
11490C
11500C       SUBROUTINE PTABLE(ZSCR,N,J,PROB)
11510C   OBJECTIVE : TO ASSIGN PROBABILITIES FROM Z-SCORES ACCORDING TO
11520C   PROPER TABLE. TABLE 1 BEGINS AT PSCR(1). TABLE 2
11530C   BEGINS AT PSCR(21). TABLE 3 BEGINS AT PSCR(41). EA

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11540C      TABLE IS 20 ELEMENTS LONG. THE VALUE FOR 19 TO INF
11550C      ITY IS IN THE 19TH LOCATION AND THE VALUE FOR 0 IS
11560C      THE 20TH.
11570C
11580C      PARAMS:
11590C          ZSCR - Z-SCORE OF TOTAL, COOP, OR CONFL
11600C          N - NUMBER OF ELEMENTS IN ARRAY
11610C          J - TABLE TYPE
11620C              2 = TOTAL ACTIVITY
11630C              4 = COOPERATIVE ACTIVITY
11640C              6 = CONFLICTUAL ACTIVITY
11650C          PROB - PROBABILITY ARRAY RETURNED
11660C
11670C
11680C      DIMENSION PROB(36)
11690C      DIMENSION ZSCR(36), PSCR(60)
11700C      DATA PSCR / .05, .1, .4, .5, .6, .6, .7, .7, .7, .7,
11710C          .8, .8, .8, .8, .8, .8, .8, .8, .9, .01,
11720C          .01, .01, .05, .1, .2, .2, .4, .4, .4, .4,
11730C          .6, .6, .6, .6, .6, .6, .6, .6, .7, .01,
11740C          .05, .1, .4, .5, .6, .6, .7, .7, .7, .7,
11750C          .8, .8, .8, .8, .8, .8, .8, .8, .9, .01 /
11760C
11770C
11780C      IF(J.EQ.2) K=0
11790C      IF(J.EQ.4) K=20
11800C      IF(J.EQ.6) K = 40
11810C
11820C      DO 10 I=1,N
11830C      IF(INT(ZSCR(I)+.5).GE.19) GOTO 20
11840C      IF(INT(ZSCR(I)+.5).LE.0) GOTO 30
11850C      IVAL = INT((ZSCR(I)+.5)*K)
11860C      GOTO 40
11870C  20 IVAL = 19 + K
11880C      GOTO 40
11890C  30 IVAL = 20 + K
11900C  40 PROB(I) = PSCR(IVAL)
11910C  10 CONTINUE
11920C      RETURN
11930C      END
11940C
11950C
11960C
11970C      LOGICAL FUNCTION NXTINC(TCODE, IDATE, CDATE)
11980C
11990C      OBJECTIVE: TO DETERMINE WHETHER OR NOT A GIVEN DATE SIGNALS
12000C      THE START OF THE NEXT TIME INCREMENT. NXTINC IS SET .TRUE.
12010C      IF THE CURRENT DATE IS INTO THE NEXT TIME INCREMENT RELATIVE
12020C      TO AN INITIAL DATE; ELSE, NXTINC IS SET .FALSE.
12030C
12040C      TCODE - TIME INCREMENT CODE--
12050C          1: MONTH
12060C          2: QUARTER
12070C          3: YEAR
12080C
12090C
12100C      IDATE - INITIAL DATE IN FORM YYYYMMDD. (SET TO CURRENT
12110C          DATE IF NXTINC IS SET TO .TRUE.; ELSE, UNCHANGED.)
12120C      CDATE - CURRENT DATE IN FORM YYMMDD.
12130C
12140C      IMPLICIT INTEGER(A-Z)
12150C
12160C
12170C      NXTINC=.FALSE.
12180C
12190C      GO TO(200,300,500),TCODE
12200C
12210C  100 CONTINUE

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12220      IF(CDATE.LE.IDATE) GO TO 800
12230      GO TO 700
12240C
12250 200 CONTINUE
12260      DELTA=CDATE/100-IDATE/100
12270      IF(DELTA.LE.0) GO TO 800
12280      GO TO 700
12290C
12300 300 CONTINUE
12310      XDATE=CDATE
12320      DELTA=CDATE/10000-IDATE/10000
12330      IF(DELTA.LE.0) GO TO 310
12340      XDATE=CDATE-8800
12350 310 CONTINUE
12360      DELTA=XDATE/100-IDATE/100
12370      IF(DELTA.LE.2) GO TO 800
12380      GO TO 700
12390C
12400 400 CONTINUE
12410      XDATE=CDATE
12420      DELTA=CDATE/10000-IDATE/10000
12430      IF(DELTA.LE.0) GO TO 410
12440      XDATE=CDATE-8800
12450 410 CONTINUE
12460      DELTA=XDATE/100-IDATE/100
12470      IF(DELTA.LE.5) GO TO 800
12480      GO TO 700
12490C
12500 500 CONTINUE
12510      XDATE=CDATE
12520      DELTA=CDATE/10000-IDATE/10000
12530      IF(DELTA.LE.0) GO TO 510
12540      XDATE=CDATE-8800
12550 510 CONTINUE
12560      DELTA=XDATE/100-IDATE/100
12570      IF(DELTA.LE.11) GO TO 800
12580      GO TO 700
12590C
12600 700 CONTINUE
12610      NXTINC=.TRUE.
12620      IDATE=CDATE
12630C
12640 800 CONTINUE
12650      RETURN
12660C
12670      END
12680C
12690C
12700C
12710      SUBROUTINE SMLTAB
12720C
12730C      OBJECTIVE - TO PRINT OUT THE 30 DAY PROBABLISTIC TABLES USING
12740C                  ARRAYS CONSTRUCTED AND PASSED THRU COMMON
12750C
12760C      MAJOR PARAMETERS:
12770C      DEKODE - SUBROUTINE TO GIVE ALPHA DATE
12780C      DEKODA - SUBROUTINE TO GIVE ALPHA DATE ARRAY
12790C      CI,CR - CHARACTER INITIATOR + RECIPIENT (3-CHRS)
12800C      IDIR - FLOW DIRECTION FOR FORMATTING
12810C      BLANC - ROUTINE TO BLANC PAGE IN MAIN
12820C      INTRUL - TIME INCREMENT ( 9 CHRS)
12830C      ISMONTH - START MONTH
12840C      ISYEAR - START YEAR
12850C      IFMONTH - FINISH MONTH
12860C      IFYEAR - FINISH YEAR
12870C      RDATE - ARRAY OF ALPHA DATES
12880C      PTOTAL - PROBABILITIES ON TOTAL EVENTS
12890C

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12900C
12910      IMPLICIT INTEGER(A-Z)
12920      COMMON /PARAM/ CI,NI,ADI(3),CR,HR,ADR(3),DUAL,
12930+      SDATE,FDATE,TCODE,SMODE,R,ISPEED,INITAB
12940      COMMON /RESLT/ COUNT,IC,DATE(36),EVENT(22,36),
12950+      COOP(36),CONFL(36),TOTAL(36),ATOTAL(36),
12960+      ZTOTAL(36),ACOO(36),ZCOOP(36),ACONFL(36),
12970+      ZCONFL(36),TF(36),ZST(36),HR(36),ZSH(36),
12980+      PTOTAL(36),PCOOP(36),PCONFL(36),RDATE(36)
12990      COMMON/POINT/BP
13000      CHARACTER*3 CI,CR
13010      CHARACTER ADI,ADR
13020      CHARACTER*9 INTRUL(3)
13030      LOGICAL DUAL
13040      REAL ZTOTAL,ZCOOP,ZCONFL
13050      REAL ZTOTAL,ACOO,ACONFL
13060      REAL ZST,ZSH,TF,HR
13070      REAL PTOTAL,PCOOP,PCONFL
13080      DATA INTRUL / 'MONTHLY','QUARTERLY','YEARLY'/
13090      IDIR=6H(<<<>>>)
13100      IF(.NOT.DUAL)IDIR=6H(>>>>>>)
13110      CALL BLANC
13120      1001 FORMAT(24X,3(3H*),1X,A3,2X,A6,2X,A3,1X,3(3H*),/)
13130      WRITE(6,1002)INTRUL(TCODE)
13140      1002 FORMAT(24X,A9,* PROBABILITY *)
13150      CALL DEKODE(SDATE,ISMONTH,ISYEAR)
13160      CALL DEKODE(FDATE,IFMONTH,IFYEAR)
13170      WRITE(6,1003)ISMONTH,ISYEAR,IFMONTH,IFYEAR
13180      1003 FORMAT(25X,A3,*,*,14,* - *,A3,*,*,14,/)
13190      WRITE(6,1001)CI,IDIR,CR
13200      WRITE(6,1004)
13210      1004 FORMAT(24X,*DATE*,9X,*PROBABILITY *,/)
13220      CALL DEKODA(IC,DATE,RDATE)
13230      NC=IC
13240      IF(IC.GT.18) 10,20
13250      10 NC=18
13260      20 DO 30 I=1,NC
13270      WRITE(6,1005)RDATE(I),PTOTAL(I)
13280      1005 FORMAT(24X,A6,10X,F6.2)
13290      30 CONTINUE
13300      READ 100,I
13310      100 FORMAT(A10)
13320      IF(IC.GT.18)11,21
13330      11 NF=NC+1
13340      CALL BLANC
13350      WRITE(6,1002)INTRUL(TCODE)
13360      WRITE(6,1003)ISMONTH,ISYEAR,IFMONTH,IFYEAR
13370      WRITE(6,1001)CI,IDIR,CR
13380      WRITE(6,1004)
13390      DO 31,I=NF,IC
13400      WRITE(6,1005)RDATE(I),PTOTAL(I)
13410      31 CONTINUE
13420      READ 100,I
13430      21 CONTINUE
13440      RETURN
13450      END
13460C
13470C
13480C
13490      SUBROUTINE DEKODE(ID,IMONTH,IYEAR)
13500C
13510C      OBJECTIVE - TO SPLIT 16 DATE INTO TWO PARTS MONTH + YEAR
13520C
13530C      PARAMETERS:
13540C          ID = 16 DATE
13550C          IMONTH = XXX (RETURNED)
13560C          IYEAR = 19XX ( " )
13570C

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13580 DIMENSION MONTHS(12)
13590 DATA MONTHS /3HJAN,3HFEB,3HMAR,3HAPR,3HMAY,3HJUN,
13600+      3HJUL,3HAUG,3HSEP,3HOCT,3HNOV,3HDEC/
13610 IY=ID/10000
13620 IM=(ID-10000*IY)/100
13630 IMONTH=MONTHS(IM)
13640 IYEAR=(IY+1900)
13650 RETURN
13660 END
13670C
13680C
13690C
13700 SUBROUTINE DEKODA(IC,IDATE,JDATE)
13710C
13720C   OBJECTIVE - TO BUILD AN ARRAY FROM DATES IN I6 FORMAT TO
13730C             ALPHA FORMAT
13740C
13750C   PARAMETERS:
13760C     IC = NUMBER OF ELEMENTS IN ARRAY
13770C     IDATE = ARRAY THAT IS IC BIG, IN I6 FORMAT (YYMMDD)
13780C     JDATE = RETURNED ARRAY IN FORM (MMM YY)
13790C     ENCODE,DECODE - UCS SYSTEM UTILITIES
13795C
13800 DIMENSION IDATE(IC),JDATE(IC),MONTHS(12)
13810 DATA MONTHS /3HJAN,3HFEB,3HMAR,3HAPR,3HMAY,3HJUN,
13820+      3HJUL,3HAUG,3HSEP,3HOCT,3HNOV,3HDEC/
13830 DO 10 I=1,IC
13840 IY=IDATE(I)/10000
13850 IM=(IDATE(I)-10000*IY)/100
13860 IMONTH=MONTHS(IM)
13870 ENCODE(6,1,ITEMP)IMONTH,IY
13880 DECODE(6,2,ITEMP)JDATE(I)
13890 2 FORMAT(A6)
13900 1 FORMAT(A3,1X,12)
13910 10 CONTINUE
13920 RETURN
13930 END
13940C
13950C
13960C
13970C
13980      OVERLAY(OURLAY,4,0)
13990C
14000C   OBJECTIVE:
14010C     TO PROVIDE GRAPHIC DISPLAY CAPABILITY TO THE PROGRAM.
14020C     THIS OVERLAY CALLS THE PLOT-10 PACKAGE USING BOTH THE
14030C     TCS AND AG-II ROUTINES.
14040C
14050C   SUBROUTINES--
14060C
14070C     PLOTIT - ALL PLOTS (BAR+GRAPH) ARE GENERATED BY A
14080C              CALL TO THIS SUBROUTINE
14090C     CHOOSE - ROUTINE DISPLAY MATRIX AND ASKS USER FOR
14100C              GRAPH TYPE, NUMBER, AND QUANTITY
14110C     USERS   - ROUTINE PLOTS PROBABILITIES ON EXISTING
14120C              GRAPH
14130C     PTABLE  - ASSIGNS PROBABILITY VALUES FOR 'USERS' ROUTINE.
14140C              UNLIKE PTABLE IN OVERLAY 2 - PROBABILITIES
14150C              ARE ONLY ONE DECIMAL PLACE
14160C     CHCMUT  - CONVERTS CHARACTER STRINGS TO ASCII ARRAYS
14170C     TITLE   - DISPLAYS TITLE OF GRAPH ON UPPER PORTION OF CRT.
14180C     LGND    - IF PLOT IS A MULTI-GRAPH ON ONE AXIS. THIS
14190C              ROUTINE WILL PLACE A LEGEND ABOVE GRAPH.
14200C
14210C   MAJOR PARAMETERS:
14215C
14220C     PLOUT   = 10X36 ARRAY CONTAINING THE 10 MAJOR OUTPUT
14230C              ARRAYS. THEY ARE ORDERED 1-10 LIKE THE MATRIX

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14240C LABELS = 2X10 ARRAY CONTAINING LABELS FOR ABOVE DATA
14250C START = INDEX ARRAY USED TO CALCULATE 'LOC'
14260C LOC = INDEX SUBROUTINE PLOTIT. GIVES INFORMATION
14270C TO LOCATE POSITION OF GRAPH ON CRT.
14280C FUCODE = 22 CATEGORIES OF EVENTS
14290C IND = ARRAY THAT CONTAINS VALUES OF PLOTS TO
14300C BE DISPLAYED.
14310C IANS = VARIABLE Y=YES, N=NO TO QUESTION 'ANOTHER
14320C DISPLAY'
14330C ADATE = REAL DATE ARRAY
14340C IGT = Y=YES(MULTI-GRAPH), N=NO
14350C NUMB = FUNCTION TO REFILL IND FOR A BLOW-UP
14360C IP = Y=YES(PROBABILITIES), N=NO
14370C
14380 PROGRAM PLOT
14390C
14400 IMPLICIT INTEGER(A-Z)
14410C
14420 COMMON /PARAM/ CI,NI,ADI(3),CR,NR,ADR(3),DUAL,
14430+ SDATE,FDATE,TCODE,SMODE,P,ISPEED,INITAB
14440 COMMON /RESLT/ COUNT,IC,DATE(36),EVENT(22,36),
14450+ COOP(36),CONFL(36),TOTAL(36),ATOTAL(36),
14460+ ZTOTAL(36),ACOO(36),ZCOOP(36),ACONFL(36),
14470+ ZCONFL(36),TF(36),ZST(36),HR(36),ZSH(36),
14480+ PTOTAL(36),PCOOP(36),PCONFL(36),RDATE(36)
14490 COMMON / CHOICE/ IYOLD,IT,IP,KNTR,PROB(36),IGT,IFLG
14500C
14510 CHARACTER*3 CI,CR
14520 CHARACTER ADI,ADR
14530 LOGICAL DUAL
14540 CHARACTER*4 FUCODE
14550 DIMENSION FUCODE(22)
14560 DIMENSION LABELS(2,10),PLOUT(36,10),START(6),LOC(13),IND(6)
14570C
14580C
14590 CHARACTER*9 INTRUL(3)
14600 CHARACTER*11 STYPE(2)
14610 REAL ZTOTAL,ZCOOP,ZCONFL,ZST,ZSH,TF,HR
14620 REAL PTOTAL,PCOOP,PCONFL
14630 REAL ADATE(36)
14640 REAL ATOTAL,ACOO,ACONFL,PROB,PLOUT
14650C
14660 DATA NE/22/
14670 DATA INTRUL/'MONTH','QUARTER','YEAR'/
14680 DATA STYPE/'NORMAL','PROGRESSIVE'/
14690 DATA FUCODE/'YLD','CMNT','CNSL','APPR','PRMS','GRNT',
14700+ 'REWD','AGRE','RGST','PROP','RJCT','ACUS',
14710+ 'PROT','DENY','DMND','WARN','THRT','DEMO',
14720+ 'RDUC','EXPL','SEIZ','FRCE'/
14730 DATA LABELS(1,1)/10HTOTAL ACTI/,LABELS(2,1)/10HUIITY /
14740 DATA LABELS(1,2)/10HTOT ACTIVI/,LABELS(2,2)/10HTY Z-SCORE/
14750 DATA LABELS(1,3)/10HCOOPERATIV/,LABELS(2,3)/10HE ACTIVITY/
14760 DATA LABELS(1,4)/10HCOO ACTIVI/,LABELS(2,4)/10HTY Z-SCORE/
14770 DATA LABELS(1,5)/10HCONFLICTUA/,LABELS(2,5)/10HL ACTIVITY/
14780 DATA LABELS(1,6)/10HCON ACTIVI/,LABELS(2,6)/10HTY Z-SCORE/
14790 DATA LABELS(1,7)/10H TENS/,LABELS(2,7)/10HION /
14800 DATA LABELS(1,8)/10H TENSION/,LABELS(2,8)/10HZ-SCORE /
14810 DATA LABELS(1,9)/10H UNCERT/,LABELS(2,9)/10HAINTY /
14820 DATA LABELS(1,10)/10HUNCERTAIN/,LABELS(2,10)/10HY Z-SCORE /
14830 DATA START/0,1,3,3,7,7/
14840 DATA LOC/13,11,12,7,8,9,10,1,2,3,4,5,6/
14850C
14860C
14870 DO 314 I=1,IC
14880 ADATE(I)=DATE(I)
14890 ATOTAL(I)=TOTAL(I)
14900 ACOOP(I)=COOP(I)
14910 314 ACONFL(I)=CONFL(I)

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14920      DO 320 J=1,IC
14930      PLOUT(J,1)=ATOTAL(J)
14940      PLOUT(J,2)=ZTOTAL(J)
14950      PLOUT(J,3)=ACOOP(J)
14960      PLOUT(J,4)=ZCOOP(J)
14970      PLOUT(J,5)=ACONFL(J)
14980      PLOUT(J,6)=ZCONFL(J)
14990      PLOUT(J,7)=TF(J)
15000      PLOUT(J,8)=ZST(J)
15010      PLOUT(J,9)=HR(J)
15020      PLOUT(J,10)=ZSH(J)
15030      320 CONTINUE
15040C
15050C      THIS IS THE SECTION THAT CALLS THE PLOT SUBROUTINE
15060C      TWO SUBROUTINES ARE INVOLVED SO FAR:
15070C      CHOOSE (IANS,IND)
15080C      WHERE
15090C      IANS = NUMBER OF PLOTS DESIRED
15100C      IND  = THE INDIVIDUAL PLOT NUMBERS
15110C
15120C      PLOTIT(ILOC,IC,ADATE,PLOUT,LABELS)
15130C
15140C
15150      20 CALL INITT(ISPEED)
15160      CALL CHOOSE(N,IND)
15170      L=N
15180      25 CALL INITT(ISPEED)
15190      IF(IGT.EQ.1HY)IFLG=0
15200      DO 10 I=1,N
15210      ILOC=LOC(I+START(N))
15220      IF(IGT.EQ.1HY) ILOC=LOC(START(2))
15230      K=IND(I)
15240      IF(IP.NE.1HY) GOTO 12
15250      GOTO(31,31,32,32,33,33,12,12,12,12),K
15260      31 J = 2
15270      GO TO 11
15280      32 J = 4
15290      GO TO 11
15300      33 J = 6
15310      11 CALL PTABLE(PLOUT(1,J),IC,J)
15320      12 CALL PLOTIT(ILOC,IC,ADATE(1),PLOUT(1,K),LABELS(1,K),IND)
15330      10 CONTINUE
15340      CALL TITLE
15350      IF(IGT.EQ.1HY) CALL LGND(L,IND)
15360      CALL FINITT(0,60)
15370      IGT=1HH
15380      READ 100,I
15390      100 FORMAT(A10)
15400      IND(1)=NUMB(I)
15410      IF(IND(1).EQ.0)GOTO 40
15420      N=1
15430      GOTO 25
15440      40 PRINT,*, ANOTHER DISPLAY (Y OR N)*,
15450      READ,IANS
15460      IF(IANS.EQ.1HY) GOTO 20
15470      RETURN
15480      END
15490C
15500C
15510C
15520C      SUBROUTINE PLOTIT(INDEX,MP,XDATA,YDATA,TEXT,INUM)
15530C
15540C      OBJECTIVE:
15550C      THIS ROUTINE IS THE SINGLE MOST IMPORTANT PART OF
15560C      THE PROGRAM. ALL PLOTS ARE GENERATED FROM HERE.
15570C      MOST OF THE CALLS ARE TO PLOT-10(AG-11)
15580C
15590C      MAJOR PARAMETERS:

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15600C INDEX = POSITION OF PLOT ON CRT 1-13
15610C NP = NUMBER OF X POINTS ON EACH PLOT
15620C XDATA = X POINTS
15630C YDATA = Y POINTS
15640C TEXT = TITLE TEXT (FROM LABELS)
15650C INUM = NUMBER OF GRAPHS BEING PLOTTED ON ONE PAGE
15660C
15670C
15680C
15690C
15700C
15710C
15720 COMMON /PARAM/ CI,NI,ADI(3),CR,NR,ADR(3),DUAL,
15730+ SDATE,FDATE,TCODE,SMODE,R,ISPEED,INITAB
15740 COMMON / CHOICE/ IYOLD,IT,IP,KNTR,PROB(36),IGT,IFLG
15750C
15760C
15770 INTEGER INUM(6)
15780 INTEGER IASCII(20),TEXT(2),ILINE(2)
15790 INTEGER TCODE,PERIOD(3),PERWIDTH(3)
15800 INTEGER POS(13),XTIT(13),YTIT(13)
15810 REAL PROB
15820 REAL X(13),Y(37),YDATA(NP)
15830 INTEGER WID(13)
15840C
15850C
15860 DATA ILINE /5454,1212/
15870 DATA PERIOD/12,4,1/
15880 DATA PERWIDTH/3,1,4/
15890 DATA(X(I),I=1,5)/-2.,0.,12.,1966.,0./
15900 DATA POS/3HUL6,3HLL6,3HUC6,3HLC6,3HUR6,3HLR6,
15910+ 3HUL4,3HLL4,3HUR4,3HLR4,3HUPH,3HLOH,3HSTD/
15920 DATA XTIT/238,238,563,563,888,888,300,300,
15930+ 800,800,500,500,500/
15940 DATA YTIT/725,350,725,350,725,350,725,350,
15950+ 725,350,725,350,725/
15960 DATA WID/15,15,15,15,15,15,20,20,20,20,40,40,40/
15970C
15980C
15990 X(2)=FLOAT(NP)
16000 X(3)=FLOAT(PERIOD(TCODE))
16010 X(4)=FLOAT(INT((XDATA/10000)+1900))
16020 X(5)=FLOAT(INT((XDATA-((X(4)-1900)*10000))/100))
16030 Y(1)=FLOAT(NP)
16035C
16036C
16040C MAJOR VARIABLES AND DATA VARIABLES:
16050C IASCII = RETURNED ASCII CHRS FROM CHCNUT ROUTINE
16060C ILINE = ALTERNATE LINES USED FOR 2 AND 3 PLOTS
16070C PER GRAPH, ILINE(1)=DASHES, ILINE(2)=DOTS
16080C XTIT = X POSITION OF TITLE DEPENDING ON POS
16090C YTIT = Y POSITION OF TITLE DEPENDING ON POS
16100C WID = INDEXED VALUES FOR WIDTH OF BAR-CHARTS
16110C JLAB = INDEXED VALUES OF X LABEL
16120C IFLG = FLAG DENOTING ITERATION ON MULTI-GRAPH
16130C TCODE = TIME INCREMENT
16140C KNTR = FLAG USED FOR PROBABILITY IF = 1 PLOT PROBS
16150C
16160C
16170C
16180C
16190 IWIDTH=WID(INDEX)/INT((NP+11.)/12.)
16200 DO 10 I=1,NP
16210 10 Y(1+I) = YDATA(I)
16220 CALL CHCNUT(20,TEXT,IASCII)
16230 JLAB=TCODE+5
16240 CALL BINITT
16250 IF(IT.EQ.1HB) CALL UBARST(0,IWIDTH,0)

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```

16260      IF(IT.EQ.1HS) CALL UBARST(8,IWIDTH,IWIDTH)
16270      IF(IGT.EQ.1HY.A.INUM(1).EQ.7) GOTO 11
16280      CALL PLACE(POS(INDEX))
16290      GOTO 12
16300      11 CALL SLIMX(150,900)
16310      12 CONTINUE
16320      CALL YLOC(0)
16330      CALL XLAB(1)
16340      CALL XWDTH(PERWDTH(TCODE))
16350      CALL YTYPE(1)
16360      IF(IFLG.GT.0.A.IGT.EQ.1HY.A.INUM(1).EQ.7)GOTO 23
16370      IF(IFLG.GT.0.A.IGT.EQ.1HY)20,21
16380      20 CONTINUE
16390      CALL XFRM(2)
16400      CALL XTYPE(JLAB)
16410      CALL XDEN(5)
16420      CALL CHECK(X,Y)
16430      CALL LLINE(ILINE(IFLG))
16440      CALL CPLOT(X,Y)
16450      GOTO 22
16460      21 CONTINUE
16470      CALL XFRM(2)
16480      CALL XTYPE(JLAB)
16490      CALL XDEN(5)
16500      CALL CHECK(X,Y)
16510      CALL DSPLAY(X,Y)
16520      22 CONTINUE
16530      IF(IGT.EQ.1HY)IFLG=IFLG+1
16540      IF(IP.NE.1HY) GOTO 30
16550      IYOLD=0
16560      KNTR = 1
16570      CALL LLINE(8888)
16580      CALL SYMBL(-1)
16590      CALL CPLOT(X,Y)
16600      GOTO 30
16610      23 CONTINUE
16620      CALL YFRM(2)
16630      CALL YLOCRT(0)
16640      CALL XLAB(0)
16650      CALL XFRM(0)
16660      CALL DLIMY(0.,0.)
16670      CALL CHECK(X,Y)
16680      CALL LLINE(ILINE(IFLG))
16690      CALL DSPLAY(X,Y)
16700      30 IF(IFLG.EQ.1.O.INDEX.LT.13) CALL FRAME
16710      IF(IGT.EQ.1HN.A.INDEX.EQ.13) CALL FRAME
16720      CALL JUSTER(20,IASCII,0,32,LEN,IOFF)
16730      IF(IGT.EQ.1HY)GOTO 31
16740      CALL MOTATE(XTIT(INDEX)+IOFF,YTIT(INDEX),LEN,IASCII)
16750      31 CONTINUE
16760      RETURN
16770      END
16780C
16790C
16800C
16810      SUBROUTINE CHOOSE(IANS,INDU)
16820C
16830C
16840      COMMON /PARAM/ CI,NI,ADI(3),CR,NR,ADR(3),DUAL,
16850+      SDATE,FDATE,TCODE,SMODE,R,ISPEED,INITAB
16860      COMMON / CHOICE/ IYOLD,IT,IP,KNTR,PROB(36),IGT,IFLG
16870      DIMENSION INDU(6)
16880      DIMENSION Z(7),RD(8),A(8),TOT(5),C(4),CON(8),T(7),U(6),L(5),
16890      INTEGER Z,RD,TOT,A,C,CON,T,U,L,N
16900      INTEGER TIT(20)
16910      INTEGER SDATE,FDATE,TCODE,SMODE
16920      REAL PROB
16930C

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16940C      LITERAL DATA FOR LABELS
16950C
16960      DATA Z/90,45,83,67,79,82,69/
16970      DATA RD/82,65,87,32,68,65,84,65/
16980      DATA TOT/84,79,84,65,76/
16990      DATA A/65,67,84,73,86,73,84,89/
17000      DATA C/67,79,79,80/
17010      DATA CON/67,79,78,70,76,73,67,84/
17020      DATA T/84,69,78,83,73,79,78/
17030      DATA U/85,78,67,69,82,84/
17040      DATA L/76,69,86,69,76/
17050      DATA N/49,50,51,52,53,54,55,56,57,49,48/
17060      DATA TIT/80,79,76,73,84,73,67,65,76,32,
17070+        73,78,68,73,67,65,84,79,82,83/
17080C
17090C      OBJECTIVE - TO PROVIDE A SUBROUTINE THAT WILL DRAW A MATRIX.
17100C      ON THE GRAPH THE USER WILL BE GIVEN A CHOICE OF HOW MANY
17110C      GRAPHS HE WANTS TO SEE AND WHICH ONES...
17120C
17130C      THE SUBROUTINE WILL PASS BACK TO OVERLAY 4, THE VALUES
17140C
17150C
17160C      N = THE NUMBER OF GRAPHS DESIRED
17170C      THIS NUMBER RANGES FROM 1-6.
17180C      INDU = THE NUMBERS OF THE GRAPHS THEMSELVES
17190C      EQUALS THE VALUE OF N..
17195C
17200C      PLOT-19 (TEKTRONICS) SOFTWARE IS BEING USER IN THIS ROUTINE
17210C      THE THREE MAIN CALLS USED ARE:
17220C      MOVABS- MOVE TO ABSOLUTE SCREEN COORD (X,Y)
17230C      DRWABS- DRAW A LINE FROM CURRENT COORD. TO (X,Y)
17240C      NOTATE- AT COORD(X,Y) PRINT N-CHARS, OF IARRAY
17250C
17260C      MAJOR PARAMETERS:
17270C      IGT  = SET TO 'Y' IF USER WANTS MULTI-GRAPH
17280C      IT   = SET TO 'G'=GRAPHS, 'B'=BAR CHARTS, 'S'=SHADED BARS
17290C      IANS = NUMBER OF CHARTS/GRAPHS DESIRED. THESE
17300C      WILL BE PLOTTED EACH WITH THEIR OWN AXIS.
17310C      INDU = THE GRAPH NUMBERS AS SHOWN IN THE MATRIX
17320C      THAT THE USER WANTS PLOTTED (FROM ONE TO SIX).
17330C      THIS VARIABLE IS USED WHEN IGT IS 'Y' OR 'N'.
17340C      IP   = IF 'Y' PROBABILITIES ARE PRINTED
17350C      IREP = MULTI-GRAPH SELECTION (1, 2, 3, OR 4)
17360C
17370C
17380C      INITIALIZE PLOT-10
17390C
17400C
17410C      MOVE TO LOWER LEFT CORNER OF RECTANGLE
17420      CALL MOVABS(200,300)
17430C      DRAW BOTTOM LINE
17440      CALL DRWABS(950,300)
17450C      DRAW RIGHT SIDE
17460      CALL DRWABS(950,600)
17470C      DRAW TOP
17480C
17490      CALL DRWABS(200,600)
17500C      DRAW LEFT SIDE
17510      CALL DRWABS(200,300)
17520C      MOVE TO THE LEFT SIDE AND DRAW A HORIZ. LINE THRU RECTANGLE
17530      CALL MOVABS(70,450)
17540      CALL DRWABS(950,450)
17550C
17560C      NOW MOVE TO THE TOP AND WITH 4 OTHER MOVES AND DRAWS
17570C      DRAW 4 VERT. LINES THRU THE RECTANGLE..THIS WILL CREATE 10
17580C      LITTLE BOXES. THAT ARE CLOSED..
17590C
17600      CALL MOVABS(350,700)

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17610      CALL DRWABS(350,300)
17620      CALL MOVABS(500,700)
17630      CALL DRWABS(500,300)
17640      CALL MOVABS(650,700)
17650      CALL DRWABS(650,300)
17660      CALL MOVABS(800,700)
17670      CALL DRWABS(800,300)
17680      CALL MOVABS(950,600)
17690      CALL DRWABS(950,700)
17700      CALL DRWABS(70,700)
17710      CALL DRWABS(70,300)
17720      CALL DRWABS(200,300)
17730      CALL MOVABS(70,700)
17740      CALL DRWABS(200,600)
17750C
17760C      NOW LABEL ALL THE BOXES
17770C
17780      CALL NOTATE(85,375,7,Z)
17790      CALL NOTATE(85,525,8,RD)
17800      CALL NOTATE(210,650,5,TOT)
17810      CALL NOTATE(210,610,8,A)
17820      CALL NOTATE(360,650,4,C)
17830      CALL NOTATE(360,610,8,A)
17840      CALL NOTATE(510,650,8,CON)
17850      CALL NOTATE(510,610,8,A)
17860      CALL NOTATE(660,650,7,T)
17870      CALL NOTATE(660,610,5,L)
17880      CALL NOTATE(810,650,6,U)
17890      CALL NOTATE(810,610,5,L)
17900C
17910C
17920C      PUT THE NUMBERS 1 THRU 10 IN THE APPROPRIATE BOXES
17930C      ALSO, RING THE BELL JUST TO GIVE THIS CODE SOME
17940C      REAL CLASS
17950C
17960      CALL NOTATE(275,525,1,N(1))
17970      CALL BELL
17980      CALL NOTATE(275,375,1,N(2))
17990      CALL BELL
18000      CALL NOTATE(425,525,1,N(3))
18010      CALL BELL
18020      CALL NOTATE(425,375,1,N(4))
18030      CALL BELL
18040      CALL NOTATE(575,525,1,N(5))
18050      CALL BELL
18060      CALL NOTATE(575,375,1,N(6))
18070      CALL BELL
18080      CALL NOTATE(725,525,1,N(7))
18090      CALL BELL
18100      CALL NOTATE(725,375,1,N(8))
18110      CALL BELL
18120      CALL NOTATE(875,525,1,N(9))
18130      CALL BELL
18140      CALL NOTATE(875,375,2,N(10))
18150      CALL BELL
18160      CALL NOTATE(400,740,20,TIT)
18170C
18180C      CALL FINITT BOTH EXITS AND POSITIONS THE CURSER BELOW THE BOX
18190      CALL FINITT(0,275)
18200      PRINT,*      DO YOU WANT MORE THAN ONE PLOT PER GRAPH (Y OR N)
18210      READ,IGT
18220      IF(IGT.EQ.1HY)GOTO 150
18230 10 PRINT,*      DO YOU WANT GRAPHS OR BAR-CHARTS (G OR B) ?
18240      READ,IT
18250      IPRT=10HGRAPHS
18260      IF(IT.EQ.1HB.O.IT.EQ.1HS)IPRT=10HCHARTS
18270      PRINT 101,IPRT
18280 101 FORMAT(4X,*HOW MANY *,A6,* DO YOU WANT (1-6) ?,T)

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AD-A039 663

DECISIONS AND DESIGNS INC MCLEAN VA
SOFTWARE DESIGN FOR AN INTERACTIVE CRISIS EARLY WARNING PROTOTY--ETC(U)
DEC 76 J F WITTMAYER
DT/TR76-20

F/G 5/2

N00014-76-C-0712

NL

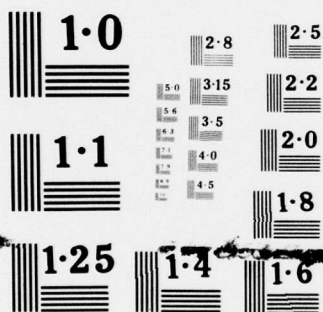
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MICROCOPY RESOLUTION TEST CHART


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18290      READ, IANS
18300      IF(IANS.LE.0.O.IANS.GT.6)20,30
18310  20 PRINT,*      MINIMUM/MAXIMUM GRAPH COUNT INCORRECT, PLEASE RE-T
18320      GOTO 10
18330  30 PRINT,* *
18340      INO=10H NUMBERS
18350      IF(IANS.EQ.1)INO=10H NUMBER
18360      IF(IANS.EQ.1)INDU(2)=0
18370      PRINT 100,IANS,IPRT,INO
18380  100 FORMAT(4X,*PLEASE TYPE IN THE*,I2,1X,A5,A8,* YOU *,/,
18390+ *      WOULD LIKE DISPLAYED IN THE FORM (1,2, ... 6) *,†)
18400      IP=1HN
18410      READ,(INDU(I),I=1,IANS)
18420      IF(IANS.GT.2)GOTO 40
18430      IF(INDU(1).GT.6.O.INDU(2).GT.6) GOTO 40
18440      IF(TCODE.NE.1)GOTO 40
18450      PRINT,/,*      DO YOU WANT PROBABILITIES (Y OR N) *,
18460      READ,IP
18470  40 CONTINUE
18480      GOTO 800
18490  150 PRINT 155
18500  155 FORMAT(4X,*YOU HAVE THESE CHOICES: *,/,10X,*1 = GRAPHS 1,3
18510+ /,10X,*2 = GRAPHS 2,4 + 6 *,
18520+ /,10X,*3 = GRAPHS 7 + 9 *,
18530+ /,10X,*4 = GRAPHS 8 + 10 *,/,4X,*PLEASE PICK ONE *,†)
18540  203 READ,IREP
18550  1001 FORMAT(4X,*INCORRECT RESPONSE, PLEASE RE-ENTER *,†)
18560      IF(IREP.LE.4.A.IREP.GE.1)GOTO 202
18570      WRITE(6,1001)
18580      GOTO 203
18590  202 CONTINUE
18600      IT=1HG
18610      J=0
18620      GOTO(200,400,600,700),IREP
18630  200 IANS=3
18640      IP=1HN
18650      DO 201 I=1,5,2
18660      J=J+1
18670      INDU(J)=I
18680  201 CONTINUE
18690      GOTO 800
18700  300 IANS=3
18710      IP=1HY
18720      DO 301 I=1,5,2
18730      J=J+1
18740      INDU(J)=I
18750  301 CONTINUE
18760      GOTO 800
18770  400 IANS=3
18780      IP=1HN
18790      DO 401 I=2,6,2
18800      J=J+1
18810      INDU(J)=I
18820  401 CONTINUE
18830      GOTO 800
18840  500 IANS=3
18850      IP=1HY
18860      DO 501 I=2,6,2
18870      J=J+1
18880      INDU(J)=I
18890  501 CONTINUE
18900      GOTO 800
18910  600 IANS=2
18920      IP=1HN
18930      DO 601 I=7,9,2
18940      J=J+1
18950      INDU(J)=I
18960  601 CONTINUE

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```

18970      GOTO 800
18980 700 IANS=2
18990      IP=1HN
19000      DO 701 I=8,10,2
19010          J=J+1
19020          INDU(J)=I
19030 701 CONTINUE
19040 800 CONTINUE
19050      RETURN
19060      END
19070C
19080C
19090C
19100      FUNCTION NUMB(I)
19110C
19120C      OBJECTIVES:
19130C      THIS FUNCTION WILL RETURN AN INTEGER FROM ONE TO TEN.
19140C      THIS IS DONE WHEN THE USER DECIDES TO BLOW-UP ONE GRAPH
19150C      AFTER HAVING PLOTTED ANYTHING PRIOR. THE USER HAS THE
19160C      OPTION OF TYPING EITHER THE NUMBER OF THE PLOT OR AN
19170C      ALPHA CODE REPRESENTING IT. THE POSSIBLE VALID ANSWERS
19180C      ARE:
19190C          1 OR TOT          6 OR CONZ
19200C          2 OR TOTZ        7 OR TEN
19210C          3 OR COO          8 OR TENZ
19220C          4 OR COOZ          9 OR UNC
19230C          5 OR CON          10 OR UNCZ
19240C
19250      DIMENSION IGOOD(10),ICH(10)
19260      DATA IGOOD/2H1,2H2,2H3,2H4,2H5,2H6,2H7,
19270+        2H8,2H9,2H10/
19280      DATA ICH/3HTOT,4HTOTZ,3HCOO,4HCOOZ,3HCON,4HCONZ,
19290+        3HTEN,4HTENZ,3HUNC,4HUNCZ/
19300      NUMB=0
19310      DO 10 K=1,10
19320          IF(I.EQ.IGOOD(K))NUMB=K
19330          IF(I.EQ.ICH(K))NUMB=K
19340 10 CONTINUE
19350      RETURN
19360      END
19370C
19380C
19390C
19400      SUBROUTINE USERS(X,Y,ISYM)
19410C
19420C      THIS ROUTINE WAS STOLEN FROM PAGE 191 OF THE AG II MANUAL
19430C      WILL LABEL POINTS WITH PROBABILITIES
19440C
19450C
19460C
19470C
19480      COMMON / CHOICE/ IYOLD,IT,IP,KNTR,PROB(36),IGT,IFLG
19490      REAL PROB
19500      INTEGER IA(15)
19510      DATA ISIZ/10/
19520      CONVERT TO SCREEN COORDINATES
19530      CALL WINCOT(X,Y,IX,IY)
19540      THIS CODE IS A FIRST ENTRY BRANCH
19550      STORE SLOPE OF LINE -DOWN OR UP- FOR LABEL LOC
19560      ISIG=IY-IYOLD
19570      BRANCH IF POINT IS OUTSIDE OF WO=INDOW
19580      IF(GENFLG(1))GOTO 100
19590      GET PARAMETERS FROM AXIS COMMON TO DEFINE LENGTH OF LABEL
19600      NBASE=IBASEY(0)
19610      NDEC=1
19620      IWIDTH=2
19630      P = PROB(KNTR)
19640      CONVERT Y VALUE TO ALPHA STRING

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19650      CALL FFORM(P,IWIDTH,NDEC,IA,32)
19660C     RIGHT JUSTIFY LABEL
19670      CALL JUSTER(IWIDTH,IA,1,32,LEN,IOFF)
19680      IF(IT.EQ.1HB.O.IT.EQ.1HS) GOTO 99
19690C     DRAW SMALL ARROW ABOVE OR BELOW LINE
19700      CALL MOVABS(IX-10,IY+ISIGN(2,ISIG))
19710      CALL DRWABS(IX,IY)
19720      CALL DRWABS(IX-2,IY+ISIGN(10,ISIG))
19730      CALL MOVABS(IX,IY)
19740      CALL DRWABS(IX-ISIZ,IY+ISIGN(ISIZ,ISIG))
19750      CALL DRWABS(IX-ISIZ-5,IY+ISIGN(ISIZ,ISIG))
19760C     WRITE OUT LABEL
19770      IYPOS=IY+ISIGN(ISIZ,ISIG)-8
19780      CALL NOTATE(IX-ISIZ-7+IOFF,IYPOS,LEN,IA(IWIDTH-LEN+1))
19790C     PREPARE FOR NEXT SLOPE CALCULATION
19800      GOTO 100
19810      99 CALL NOTATE(IX-10,IY+5,LEN,IA(IWIDTH-LEN+1))
19820      100 IYOLD=IY
19830      KNTR = KNTR + 1
19840      RETURN
19850      END

19860C
19870C
19880C
19890      SUBROUTINE PTABLE(ZSCR,N,J)
19900C
19910C     OBJECTIVE : TO ASSIGN PROBABILITIES FROM Z-SCORES ACCORDING TO
19920C                PROPER TABLE. TABLE 1 BEGINS AT PSCR(1). TABLE 2
19930C                BEGINS AT PSCR(21). TABLE 3 BEGINS AT PSCR(41). EA
19940C                TABLE IS 20 ELEMENTS LONG. THE VALUE FOR 19 TO INF
19950C                ITY IS IN THE 19TH LOCATION AND THE VALUE FOR 0 IS
19960C                THE 20TH.
19970C
19980C     PARAMS:
19990C         ZSCR - Z-SCORE OF TOTAL,COOP, OR CONFL
20000C         N - NUMBER OF ELEMENTS IN ARRAY
20010C         J - TABLE TYPE
20020C             2 = TOTAL ACTIVITY
20030C             4 = COOPERATIVE ACTIVITY
20040C             6 = CONFLICTUAL ACTIVITY
20050C         PROB - PROBABILITY ARRAY RETURNED
20060C
20070C
20080      COMMON / CHOICE/ IYOLD,IT,IP,KNTR,PROB(36),IGT,IFLG
20090      DIMENSION ZSCR(36),PSCR(60)
20100      DATA PSCR /.1,.1,.4,.5,.6,.6,.7,.7,.7,.7,
20110+             .8,.8,.8,.8,.8,.8,.8,.8,.9,.1,
20120+             .1,.1,.1,.1,.2,.2,.4,.4,.4,.4,
20130+             .6,.6,.6,.6,.6,.6,.6,.6,.7,.1,
20140+             .1,.1,.4,.5,.6,.6,.7,.7,.7,.7,
20150+             .8,.8,.8,.8,.8,.8,.8,.8,.9,.1/
20160C
20170C
20180      IF(J.EQ.2) K=0
20190      IF(J.EQ.4) K=20
20200      IF(J.EQ.6) K = 40
20210C
20220      DO 10 I=1,N
20230      IF(INT(ZSCR(I)+.5).GE.19) GOTO 20
20240      IF(INT(ZSCR(I)+.5).LE.0) GOTO 30
20250      IVAL = INT((ZSCR(I)+.5)+K)
20260      GOTO 40
20270      20 IVAL = 19 + K
20280      GOTO 40
20290      30 IVAL = 20 + K
20300      40 PROB(I) = PSCR(IVAL)
20310      10 CONTINUE
20320      RETURN

```



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20330      END
20340C
20350C
20360C
20370      SUBROUTINE CHCNVT(N,TEXT,IASCII)
20380C
20390C      OBJECT: THIS ROUTINE WILL TAKE A TEXT CHARACTER STRING OF
20400C      OF N LENGTH AND CONVERT IT TO USASCII CODE FUNCTIONS FOR
20410C      PLOT-10 (AG-II) PLOTTER OUTPUT...
20420C
20430C      PARAMS:
20440C      N-NUMBER OF CHARS TO CONVERT
20450C      TEXT- TEXT ARRAY
20460C      IASCII- OUTPUT ARRAY IN UASCII CODE
20470C
20480      DIMENSION TEXT(N),IASCII(N),XTEXT(72),USASCII(63)
20490      INTEGER IASCII,USASCII,IVAL,FORM
20500      INTEGER XTEXT
20510C
20520C      DATA FOR 1-63 DECIMAL 6-BIT BYTE CHARACTER SET
20530C
20540C      DATA FOR A-Z
20550      DATA USASCII /65,66,67,68,69,70,71,72,73,74,75,76,77,78,79,8
20560+      81,82,83,84,85,86,87,88,89,90,
20570C      DATA FOR 0-9
20580+      48,49,50,51,52,53,54,55,56,57,
20590C      DATA FOR +-*/<>$= ,."[]: '
20600+      43,45,42,47,40,41,36,61,32,44,46,34,91,93,58,39
20610C      DATA FOR X-ON,CR,LF,↑,X-OFF,<,>,UNUSED,?,UNUSED,↓
20620+      32,13,10,94,32,60,62,32,63,32,59/
20630C
20640C      CREATE VARIABLE FORMAT TO BE USED BY DECODE
20650C
20660      ENCODE(6,101,FORM)N
20670      101 FORMAT(1H(,12,3HR1))
20680C
20690C      BREAK UP TEXT STRING TO ONE R1 CHARACTER PER WORD
20700C
20710      DECODE(N,FORM,TEXT)XTEXT
20720C
20730C      TABLE LOOK-UP
20740C
20750      DO 10 I=1,N
20760      IVAL=XTEXT(I)
20770      IASCII(I)=USASCII(IVAL)
20780C
20790      10 CONTINUE
20800      RETURN
20810      END
20820C
20830C
20840C
20850      SUBROUTINE TITLE
20860C
20870C      OBJECTIVE:
20880C      TO DISPLAY THE TWO EXPANDED COUNTRY NAMES (30 CHARACTERS)
20890C      IN THE TOP CENTER OF THE CRT AFTER ANY TYPE OF PLOT
20900C      THE FIRST NAME WILL BE THE INITIATOR. THE SECOND
20910C      THE RECIPIENT. IN BETWEEN THESE WILL BE AN ARROW
20920C      DRAWN WITH PLOT-10 TCS CALLS. THE ARROW WILL HAVE
20930C      EITHER A DOUBLE POINT DENOTING 2-WAY FLOW OR ONE
20940C      POINT DENOTING A SINGLE FLOW. IN THE CASE OF A
20950C      SINGLE FLOW FROM RECIPIENT TO INITIATOR THE CI +
20960C      CR, NI AND NR, ADI AND ADR WILL BE FLIP-FLOPPED.
20970C
20980      COMMON /PARAM/ CI,NI,ADI(3),CR,NR,ADR(3),DUAL,
20990+      SDATE,FDATE,TCODE,SMODE,R,ISPEED,INITAB
21000      INTEGER ADR,ADI,INITR(30),RECIP(30)

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21010      LOGICAL DUAL
21020      CALL CHCNUT(30,ADI,INITR)
21030      CALL CHCNUT(30,ADR,RECIP)
21040      DO 20 I=1,30
21050      IF(INITR(I).EQ.32.A.INITR(I+1).EQ.32)GOTO 21
21060      20 CONTINUE
21070      21 ILEN=I
21080      DO 30 J=1,30
21090      IF(RECIP(J).EQ.32.A.RECIP(J+1).EQ.32)GOTO 31
21100      30 CONTINUE
21110      31 JLEN=J
21120      CALL JUSTER(ILEN,INITR,+1,32,LEN,IOFF)
21130      CALL NOTATE(410+IOFF,765,LEN,INITR)
21140      IX=450
21150      IY=775
21160C
21170C      DRAW ARROW
21180C
21190      CALL MOVABS(IX,IY)
21200      CALL DRWREL(100,0)
21210      CALL DRWREL(-20,5)
21220      CALL MOUREL(0,-10)
21230      CALL DRWREL(20,5)
21240      IF(.NOT.DUAL) GOTO 10
21250      CALL MOUREL(-100,0)
21260      CALL DRWREL(20,5)
21270      CALL MOUREL(0,-10)
21280      CALL DRWREL(-20,5)
21290C
21300      10 CALL JUSTER(JLEN,RECIP,-1,32,LEN1,IOFF1)
21310      CALL NOTATE(600,765,LEN1,RECIP)
21320      RETURN
21330      END
21340C
21350C
21360C      SUBROUTINE LGND(IANS,IND)
21370
21380C      OBJECTIVE:
21390C      IF IGT = 'Y' THEN THE USER HAS CHOSEN A MULTI-GRAPH
21400C      GRAPH, AND JUST BELOW THE TITLE. THE LEGEND WILL
21410C      CONSIST OF THE ASSOCIATED LINE DRAWN ON THE GRAPH
21420C      FOLLOWED BY THE 3 OR 4 LETTER CODE NAMING IT. SINCE
21430C      THE OPTIONS ALLOW ONLY 2 OR 3 CURVES ON A MULTI-GRAPH
21440C      THE LEGEND HAS ONLY TWO OR THREE LINES FOLLOWED BY THE
21450C      CURVE NAME.4
21460C
21465C
21470C      PARAMETERS:
21480C      IANS = NUMBER OF CURVES (2 OR 3)
21490C      IND  = THE MATRIX NUMBERS OF THESE CURVES (1-10)
21500C
21510      DIMENSION IND(6),ILINE(2),ITITL(10),IPRT(6)
21520      DIMENSION IFST(4),ISND(4),ITRD(4)
21530      DATA ILINE /5454,1212/
21540      DATA ITITL /4HTOT,4HTOTZ,4HCOO,4HCOOZ,4HCON,4HCONZ,
21550+      4HTEN,4HTENZ,4HUNC,4HUNCZ/
21560      CALL MOVABS(250,720)
21570      CALL DRWABS(350,720)
21580      IF(IANS.EQ.2) GOTO 10
21590      CALL MOVABS(450,720)
21600      CALL DSHABS(550,720,ILINE(1))
21610      N=2
21620      GOTO 30
21630      10 N=1
21640      30 CONTINUE
21650      CALL MOVABS(650,720)
21660      CALL DSHABS(750,720,ILINE(N))
21670      CALL CHCNUT(4,ITITL(IND(1)),IFST)

```



```

21680      CALL CHCNUT(4,ITITL(IND(2)),ISND)
21690      IF(IANS.EQ.3) CALL CHCNUT(4,ITITL(IND(3)),ITRD)
21700      CALL NOTATE(370,720,4,IFST)
21710      IF(IANS.EQ.2) GOTO 60
21720      CALL NOTATE(570,720,4,ISND)
21730      N=3
21740      GOTO 70
21750      60 N=2
21760      70 CONTINUE
21770      IF(N.EQ.2) CALL NOTATE(770,720,4,ISND)
21780      IF(N.EQ.3) CALL NOTATE(770,720,4,ITRD)
21790      RETURN
21800      END
21810C
21820C
21830C
21840C
21850      OVERLAY(OUURLAY,5,0)
21860C
21870      PROGRAM TABULAR
21880C
21890C      OBJECTIVE:
21900C      THIS OVERLAY WILL PRINT THE ARRAYS GENERATED IN
21910C      OVERLAY 2,0 IN TABULAR FORM
21915C
21920C      SUBROUTINES:
21930C      DEKODE - ROUTINE RETURNS THE ALPHA MONTH AND YEAR
21940C              FROM AN INTEGER I6 INPUT
21950C
21960      IMPLICIT INTEGER(A-Z)
21970C
21980      COMMON /PARAM/ CI,NI,ADI(3),CR,NR,ADR(3),DUAL,
21990+                SDATE,FDATE,TCODE,SMODE,R,ISPEED,INITAB
22000      COMMON /RESLT/ COUNT,IC,DATE(36),EVENT(22,36),
22010+                COOP(36),CONFL(36),TOTAL(36),ATOTAL(36),
22020+                ZTOTAL(36),ACOO(36),ZCOOP(36),ACONFL(36),
22030+                ZCONFL(36),TF(36),ZST(36),HR(36),ZSH(36),
22040+                PTOTAL(36),PCOOP(36),PCONFL(36),RDATE(36)
22050C
22060      CHARACTER*3 CI,CR
22070      CHARACTER ADI,ADR
22080      LOGICAL DUAL
22090      CHARACTER*4 FUCODE
22100      DIMENSION FUCODE(22)
22110      CHARACTER*9 INTRUL(3)
22120      CHARACTER*11 STYPE(2)
22130      REAL ZTOTAL,ZCOOP,ZCONFL,ZST,ZHR,TF,HR
22140      REAL PTOTAL,PCOOP,PCONFL
22150C
22160      DATA NE/22/
22170      DATA INTRUL /' MONTHLY','QUARTERLY',' YEARLY'/
22180      DATA STYPE/'NORMAL','PROGRESSIVE'/
22190      DATA FUCODE/'YLD','CMNT','CNLS','APPR','PRMS','GRNT',
22200+                'REWD','AGRE','RQST','PROP','RJCT','ACUS',
22210+                'PROT','DENY','DMND','WARN','THRT','DEMO',
22220+                'RDOC','EXPL','SEIZ','FRCE'/
22230C
22240      CALL DEKODE(SDATE,ISM,ISY)
22250      CALL DEKODE(FDATE,IFM,IFY)
22260C
22270      4006 FORMAT(22X,A9,1X,'COOPERATIVE ACTIVITY')
22280      4009 FORMAT(22X,A9,1X,'CONFLICTUAL ACTIVITY')
22290      4016 FORMAT(27X,A3,'-',I4,'-',A3,'-',I4,'')
22300      4005 FORMAT(11X,'TOTAL ACTIVITY',6X,'COOPERATIVE ACTIVITY',
22310+                2X,'CONFLICTUAL ACTIVITY',2X,'DATE',3X,
22320+                3('NUMBER Z-SCORE PROB '))
22330      6005 FORMAT(11X,'TOTAL ACTIVITY',6X,'COOPERATIVE ACTIVITY',
22340+                2X,'CONFLICTUAL ACTIVITY',2X,'DATE',3X,

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23030      WRITE(6,4002)CI, IDIR, IFLO, CR
23040      WRITE(6,5002)
23050      DO 385 I = NF, IC
23060      WRITE(6,5006)RDATE(I), TF(I), ZST(I), HR(I), ZSH(I)
23070 385 CONTINUE
23080      READ 100, I
23090 513 CALL BLANC
23100      PRINT, * DO YOU WANT EVENT FREQUENCIES (Y OR N)*,
23110      READ 100, I
23120      IF(I.EQ.1HY)359, 390
23130 359 CALL BLANC
23140      WRITE(6,4006)INTRUL(TCODE)
23150      WRITE(6,4016)ISM, ISY, IFM, IFY
23160      WRITE(6,4002)CI, IDIR, IFLO, CR
23170      WRITE(6,4007)(FUCODE(E), E=1, 10)
23180 4007 FORMAT(10X, 'DATE', 4X, 12(A4, 1X))
23190      WRITE(6,4008)
23200 4008 FORMAT(' ')
23210      NC=IC
23220      IF(IC.GT.18) 520, 521
23230 520 NC=18
23240 521 DO 360 I=1, NC
23250      WRITE(6,5005)RDATE(I), (EVENT(E, I), E=1, 10)
23260 5005 FORMAT(9X, A6, ' ', 12(14, 1X))
23270 360 CONTINUE
23280      READ 100, I
23290      IF(IC.GT.18)522, 523
23300 522 NF=NC+1
23310      CALL BLANC
23320      WRITE(6,4006)INTRUL(TCODE)
23330      WRITE(6,4016)ISM, ISY, IFM, IFY
23340      WRITE(6,4002)CI, IDIR, IFLO, CR
23350      WRITE(6,4007)(FUCODE(E), E=1, 10)
23360      WRITE(6,4008)
23370      DO 365 I=NF, IC
23380      WRITE(6,5005) RDATE(I), (EVENT(E, I), E=1, 10)
23390 365 CONTINUE
23400      READ 100, I
23410 523 CALL BLANC
23420      WRITE(6,4009)INTRUL(TCODE)
23430      WRITE(6,4016)ISM, ISY, IFM, IFY
23440      WRITE(6,4002)CI, IDIR, IFLO, CR
23450      WRITE(6,6007)(FUCODE(E), E=11, 22)
23460 6007 FORMAT(6X, 'DATE', 4X, 12(A4, 1X))
23470 6009 FORMAT(5X, A6, ' ', 12(14, 1X))
23480      WRITE(6,4008)
23490      NC=IC
23500      IF(IC.GT.18)530, 531
23510 530 NC=18
23520 531 DO 370 I=1, NC
23530      WRITE(6,6009)RDATE(I), (EVENT(E, I), E=11, 22)
23540 370 CONTINUE
23550      READ 100, I
23560      IF(IC.GT.18)532, 390
23570 532 NF=NC+1
23580      CALL BLANC
23590      WRITE(6,4009)INTRUL(TCODE)
23600      WRITE(6,4016)ISM, ISY, IFM, IFY
23610      WRITE(6,4002)CI, IDIR, IFLO, CR
23620      WRITE(6,6007)(FUCODE(E), E=11, 22)
23630      WRITE(6,4008)
23640      DO 375 I=NF, IC
23650      WRITE(6,6009)RDATE(I), (EVENT(E, I), E=11, 22)
23660 375 CONTINUE
23670      READ 100, I
23680 390 CONTINUE
23690      END
23700C

```

23710C
23720C
23725C
23726C
23730
23735C
23736C
23737C
23740
23750
23760+
23770
23780
23790
23800
23810
23820
23830C
23840C
23850C
23860C

SUBROUTINE DEKODE(ID,IMONTH,IYEAR)

SUBROUTINE DESCRIBED IN OVERLAY 2,0

DIMENSION MONTHS(12)

DATA MONTHS /3HJAN,3HFEB,3HMAR,3HAPR,3HMAY,3HJUN,
3HJUL,3HAUG,3HSEP,3HOCT,3HNOV,3HDEC/

IY=ID/10000

IM=(ID-10000*IY)/100

IMONTH=MONTHS(IM)

IYEAR=(IY+1900)

RETURN

END

APPENDIX A
NATION FILE

NATION FILE

780 AFG AFGHANISTAN
 339 ALB ALBANIA
 615 ALG ALGERIA
 232 AND ANDORRA
 561 ANG ANGOLA
 160 ARG ARGENTINA
 900 AUL AUSTRALIA
 305 AUS AUSTRIA
 695 BAH BAHRAIN
 053 BAR BARBADOS
 211 BEL BELGIUM
 266 EBE BERLIN/EAST
 267 WBE BERLIN/WEST
 760 BHU BHUTAN
 765 BGD BANGLADESH
 145 BOL BOLIVIA
 571 BOT BOTSWANA
 140 BRA BRAZIL
 355 BUL BULGARIA
 775 BUR BURMA
 516 BUI BURUNDI
 811 CAM CAMBODIA
 471 CAO CAMEROUN
 020 CAN CANADA
 431 CPV CAPE VERDE
 482 CEN CENTRAL AFRICAN REP
 780 CEY CEYLON
 483 CHA CHAD
 155 CHL CHILE
 710 CHN CHINA, PEOPLES REP
 713 CHT CHINA, REP OF
 100 COL COLUMBIA
 495 COM COMORO ISLANDS
 484 CON CONGO (BRAZZAVILLE)
 490 COP ZAIRE (CONGO-KINSHASA)
 094 COS COSTA RICA
 040 CUB CUBA
 352 CYP CYPRUS/GREEK
 353 CYT CYPRUS/TURKISH
 315 CZE CZECHOSLOVAKIA
 434 DAH DAHOMEY
 390 DEN DENMARK
 042 DOM DOMINICAN REP
 130 ECU ECUADOR
 092 ELS EL SALVADOR
 440 GUE EQUITORIAL GUINEA
 531 ELF ERITREAN LIBERATION FRONT
 530 ETH ETHIOPIA
 375 FIN FINLAND
 220 FRN FRANCE
 980 FIJ FIJI
 555 FRE FRELIMO-MOZAMBIQUE LIB. ORG.
 481 GAB GABON
 420 GAM GAMBIA
 265 GME GERMANY/DEM REP
 255 GMY GERMANY/FED REP
 452 GHA GHANA
 350 GRC GREECE
 090 GUA GUATEMALA
 438 GUI GUINEA
 441 GBI GUINEA-BISSAU
 110 GUY GUYANA

041 HAI HAITI
 091 HON HONDURAS
 310 HUN HUNGARY
 720 HOK HONG KONG
 395 ICE ICELAND
 750 IND INDIA
 850 INS INDONESIA
 630 IRN IRAN
 645 IRQ IRAQ
 205 IRE IRELAND
 666 ISR ISRAEL
 325 ITA ITALY
 437 IVO IVORY COAST
 051 JAM JAMAICA
 740 JAP JAPAN
 663 JOR JORDAN
 501 KEN KENYA
 731 KOH KOREA/NORTH
 732 KOS KOREA/SOUTH
 641 KUR KURDISTAN
 690 KUW KUWAIT
 812 LAO LAOS
 660 LEB LEBANON
 570 LES LESOTHO
 450 LBR LIBERIA
 620 LBY LIBYA
 223 LIC LIECHTENSTEIN
 212 LUX LUXENBURG
 721 MAC MACAO
 500 MAG MALAGASY
 553 MAW MALAWI
 820 MAL MALAYSIA
 782 MAD MALDIVE
 432 MLI MALI
 338 MLT MALTA
 590 MAR MAURITIUS
 435 MAU MAURITANIA
 070 MEX MEXICO
 221 MOC MONACO
 712 MON MONGOLIA
 600 MOR MOROCCO
 698 MOM MUSCAT AND OMAN
 562 NMB NAMIBIA
 921 NAU NAURU
 921 NAU NAURU
 790 NEP NEPAL
 210 NTH NETHERLANDS
 920 NEW NEW ZEALAND
 093 NIC NICARAGUA
 436 NIR NIGER
 475 NIG NIGERIA
 385 NOR NORMAY
 770 PAK PAKISTAN
 095 PAN PANAMA
 905 PAP PAPUA NEW GUINEA
 150 PAR PARAGUAY
 135 PER PERU
 840 PHI PHILIPPINES
 290 POL POLAND
 235 POR PORTUGAL
 485 STU PRINCIPEE AND SAO TOME
 696 QAT QATAR
 552 RHO RHODESIA
 360 RUM RUMANIA
 517 RWA RWANDA
 331 SAN SAN MARINO
 670 SAU SAUDI ARABIA
 433 SEN SENEGAL

451 SIE SIERRA LEONE
 830 SIN SINGAPORE
 520 SOM SOMALIA
 560 SAF SOUTH AFRICA
 681 SYE SOUTH YEMEN
 230 SPN SPAIN
 625 SUD SUDAN
 105 SUR SURINAM
 572 SWA SWAZILAND
 380 SWD SWEDEN
 225 SWZ SWITZERLAND
 652 SYR SYRIA
 510 TAZ TANZANIA
 800 TAI THAILAND
 861 TIB TIBET
 461 TOG TOGO
 052 TRI TRINIDAD-TOBAGO
 616 TUN TUNISIA
 640 TUR TURKEY
 500 UGA UGANDA
 365 USR USSR
 675 UAE UNITED ARAB EMIRATES
 651 UAR UAR (EGYPT)
 200 UNK UNITED KINGDOM
 002 USA USA
 439 UPP UPPER VOLTA
 165 URU URUGUAY
 328 VAT VATICAN
 101 VEN VENEZUELA
 817 UTS VIETNAM/SOUTH
 816 UTN VIETNAM/NORTH
 990 WSM WESTERN SAMOA
 678 YEM YEMEN
 681 SYE YEMAN/SOUTH
 345 YUG YUGOSLAVIA
 551 ZAM ZAMBIA
 554 ZIM ZIMBABWE-RHODESIA LIB. ORG.
 196 AFP ALLIANCE FOR PROGRESS
 699 ARL ARAB LEAGUE
 476 BIA BIAFRA
 397 EEC EEC
 398 EFT EFTA
 396 NAT NATO
 199 OAS OAS
 599 OAU OAU
 697 PLO ARAB COMMANDO GROUPS
 813 LAP PATHET LAO
 992 SEA SEATO
 818 UCG VIETCONG AND NLF
 394 WAR WARSAW PACT
 399 UNO ANY INTL ORG (UN, ETC)
 998 MLG ANY MULTILATERAL GRP
 999 NSC NOT STATED, UNIDENTIFIED TRGT

APPENDIX B
RWINDX FILE

RWINDX FILE

6601	1
6602	63
6603	116
6604	163
6605	198
6606	247
6607	286
6608	365
6609	422
6610	480
6611	540
6612	596
6701	639
6702	682
6703	763
6704	796
6705	839
6706	877
6707	952
6708	979
6709	1024
6710	1066
6711	1091
6712	1110
6801	1122
6802	1157
6803	1188
6804	1213
6805	1253
6806	1322
6807	1360
6808	1453
6809	1535
6810	1618
6811	1665
6812	1692
6901	1725
6902	1774
6903	1826
6904	1936
6905	1999
6906	2061
6907	2081
6908	2125
6909	2167
6910	2208
6911	2275
6912	2307
7001	2338
7002	2367
7003	2415
7004	2447
7005	2483
7006	2528
7007	2558
7008	2597
7009	2621
7010	2650
7011	2739
7012	2812
7101	2840
7102	2879

7103	2942
7104	2994
7105	3103
7106	3168
7107	3202
7108	3226
7109	3257
7110	3297
7111	3362
7112	3492
7201	3851
7202	3951
7203	4071
7204	4146
7205	4206
7206	4268
7207	4314
7208	4356
7209	4405
7210	4473
7211	4539
7212	4601
7301	4666
7302	4701
7303	4775
7304	4858
7305	4918
7306	4970
7307	5067
7308	5125
7309	5183
7310	5319
7311	5468
7312	5573
7401	5660
7402	5725
7403	5795
7404	5852
7405	5913
7406	5959
7407	5999
7408	6050
7409	6088
7410	6107
7411	6156
7412	6195
7501	6204
7502	6228
7503	6262
7504	6274
7505	6287
7506	6307
7507	6323
7508	6344
7509	6371
7510	6408
7511	6445
7512	6492
-0	6552

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Statement of Problem and Proposed Solution. This report describes in detail one component of the development of an integrated crisis warning system, the design and use of interactive computer software necessary for the development of such a system. The component was developed for the Defense Advanced Research Projects Agency's Cybernetics Technology Office during the period from January 1 to September 30, 1976. Interactive software is		

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an essential component of the development, testing, and evaluation of a user-oriented integrated system and of prototype crisis warning systems.

Design, Test, and Demonstration of the First Stage Crisis Early Warning Prototype System. The prototype system, as designed, tested, and developed, was comprised of:

- (1) five quantitative international political indicators;
- (2) a forecasting capability which includes an international crisis object, a short-range retrospective goal, and an associative method; and
- (3) a sophisticated computer base endowed with efficient information storage, retrieval, processing, and display capabilities.

The system has been tested for its ability or inability to forecast crises retrospectively. The demonstration system for the prototype is comprised of computer hardware and software necessary for the design, installation, and operation of interactive user-oriented systems. ✓

System Description. The prototype system described in this report is the foundation upon which future systems will be built in parallel with the on-going development and application of quantitative indicators for early warning. The system is an overlaid FORTRAN program consisting of 1 main overlay, PROGRAM ANALYZ; 4 primary overlays, PROGRAMS DIALOG, SEARCH, PLOT, AND TABULAR; 26 subroutines; and 2 functions. The system is written in Super FORTRAN (a United Computing Systems, Incorporated compiler), and requires a time-sharing driver resident on a host mainframe. The program is relatively inefficient without the use of a Tektronix graphics terminal.

Sample Program Output. A sample of the output from the crisis early warning prototype system is notated to describe the area in the program from which the output is generated.

System Design. A graph of the crisis early warning prototype shows the relationship each overlay and its associated subroutines has to the main overlay as well as to each other.

System Flow Charts. The main overlay and each of the primaries are flow charted. Calls to the subroutines are shown as predefined processes and not charted individually.

Documented FORTRAN Source Code. To allow access and ease of modification to any FORTRAN programmer, each routine is internally documented. Appendix A and B contain, respectively, the NATION file and the RWINDX file, the index for the events file by month.

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